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BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN AGRICULTURE

DDT

BHC

For Insecticide Manufacturers • Compounders • Mixers

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(89° Min. Setting Point)

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50% DDT Dust Base, Micro-Fine
(Genitox D50)

Emulsifiable Oil Concentrates
(Genitol† EM25 and EM30)

Solvent Concentrates
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■BHC

Benzene Hexachloride

Technical Grade

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Wettable Powder

Dust Mixtures

Oil Concentrates

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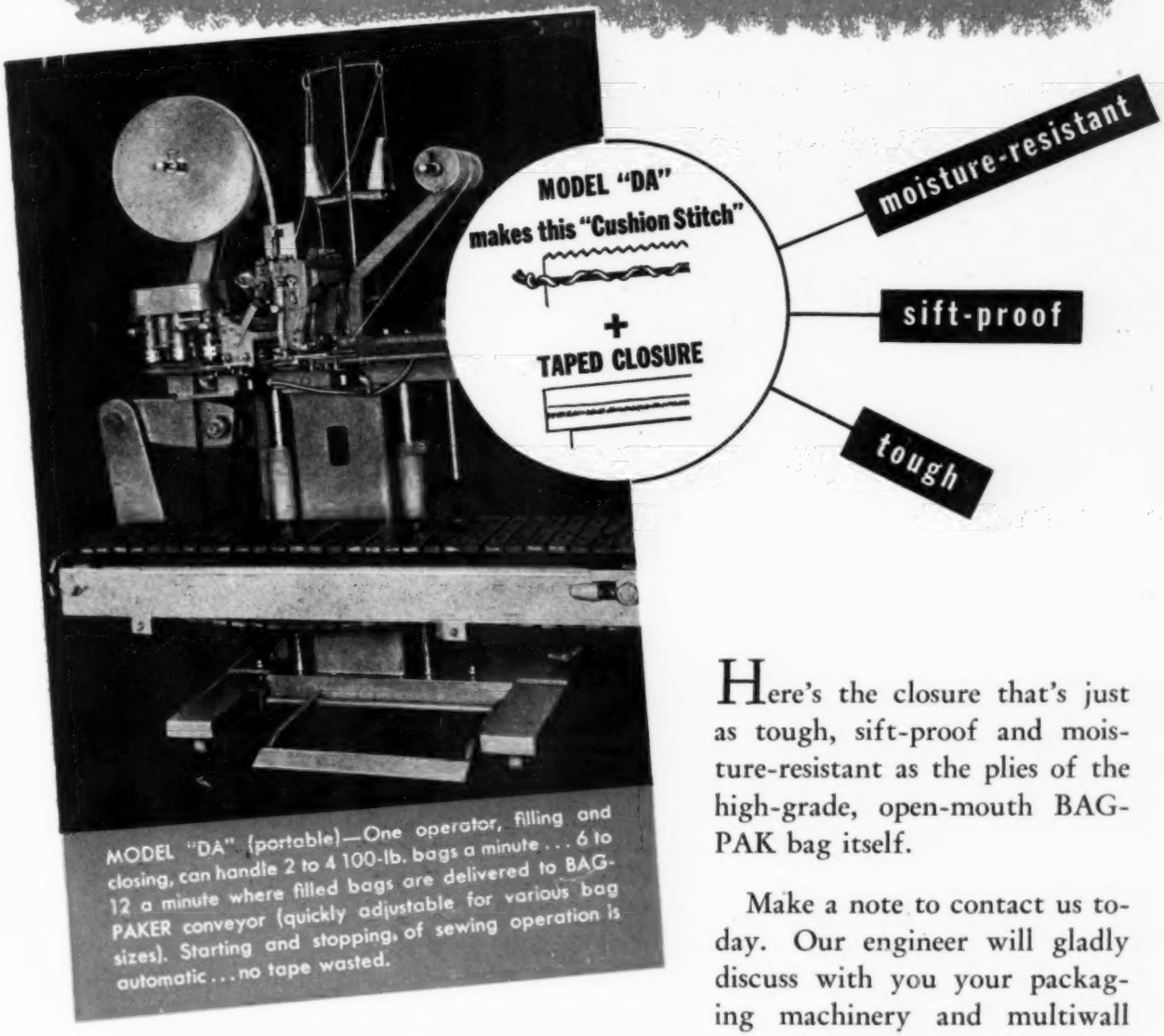

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AGRICULTURAL CHEMICALS

A Monthly Magazine For the Trade

THIS MONTH'S COVER

Chemical defoliation of cotton gives growers better control of harvest time, and enables them to use fast and efficient mechanical pickers at harvest. Photo shows a field of cotton completely defoliated, awaiting the picking machine.

NOVEMBER 1947
VOL. II No. 11

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AGRICULTURAL CHEMICALS

Subscription Rates: *One year* $3.00, *two years* $5.00. *Outside U. S. one year,* $4.00. *Published monthly on the 15th by Industry Publications, Inc. Office of Publication, 123 Market Place, Baltimore 2, Md. Advertising and editorial office, 254 W. 31st St., New York, 1, N. Y. Advertising rates made known on application. Closing date for copy—25th of the month previous to date of issue.*

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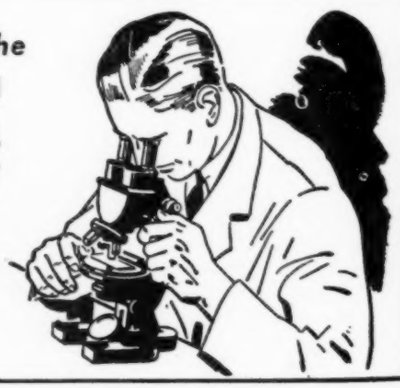

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*Reported September, 1947
THESE REPORTS... reflect the progress of chemical science in providing more effective tools for farm pest control.

"Zerlate" is a new organic fungicide based on zinc dimethyldithiocarbamate. It is highly effective against a number of fruit and vegetable diseases; and along the Atlantic Coast, "Zerlate" has proved especially effective for repelling Japanese beetle on peaches.

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when you want "perfection of application"...

Available with copper or galvanized tank.

● Successful spraying calls for teamwork — the *right spray* applied the *right way.* And the famous Hudson "Perfection"* is the compressed air sprayer that teams up perfectly with quality spraying materials. Here's why:

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but how *Well!*

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But they also offer their customers special formulations, created by the combination of *their* understanding of unusual local needs and *our* research and experience. This policy has increased their insecticide profits, added to their reputation for service and greatly expanded their local market.

Now we offer this to you—highest quality basic ingredients AND cooperation in developing big-profit, specialty formulations. Wire or write McLaughlin Gormley King Company, Minneapolis, Minn.

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Makers of Insecticides - Founded 1902

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It will be a Good Year!

You don t run your business on the word of soothsayers and crystal-gazers and neither do we. But, based on observations below, the outlook for insecticides in 1948 seems most promising:

1. Growers will need more insecticides to raise sorely needed crops, and the economy of increasing yields by insect control is universally accepted. New methods of spray and dust application will also increase usage.
2. Insecticides are better rated after laboratory and field experiences of 1946 and 1947. Reliable data on the effectiveness of new toxicants are now available and much of the recent confusion has been clarified.
3. Costs of basic insecticides will be on a lower level because, generally speaking, production equals or exceeds demand. *Be sure to get our prices before placing your orders for:*

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Rodine—Rural areas represent a large sales potential for a safe, effective raticide.

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THE EDITOR COMMENTS

WE sometimes wonder if desire for a spectacular means of "saving" food must not be the motive behind certain recommendations emanating from Washington, of late. Certainly, there are better methods to achieve the goal of increasing the world's supply of food than some of the plans currently under way toward that end. The A. I. F. Association seems to have hit the nail squarely on the head when it goes on record as favoring greater *production* of foodstuffs, rather than adopting a parsimonious philosophy toward the subject. In a telegram to President Truman in October, the Association stated that any "waste less" food program should be buttressed by a "produce more" plan, brought about "through the extension and more efficient application methods of controlling pests which cause prodigious loss" of grains such as feed corn, domestic wheat, oats and barley. Domestic corn production in 1948 could be increased by a minimum of 150 million bushels, the Association declares, and domestic wheat, oats and barley production could be upped by 40 to 50 million bushels. And all this without acreage expansion, because chemicals necessary for this are now available, whereas during the war they could not be had in sufficient quantities.

The telegram stated that conservation of corn and small grains should begin in the crop-making stage on the farm, and that this protection should be continued in storage. It is pointed out that meat production would be increased through better control of livestock pests, and that research and extension personnel of the U. S. Department of Agriculture and of state agricultural colleges would be most logical to "organize and direct a coordinated, cooperative program to this end."

Time is of the essence in developing a full pest control program for 1948, particularly in view of the big organizational job involved in coordinating the efforts of Federal Government personnel, state agricultural colleges, growers and their organizations, and manufacturers and distributors of pesticides. Combined efforts, however, could go a long way toward achieving the increase in available foodstuffs for the world market.

In view of this, it is gratifying to see the U. S. Department of Agriculture backing an "all out" plan of eliminating insect and rodent pests which destroy stored grain in large quantities, as reported on page 53.

BECAUSE of increased attention to fertilizers and liming materials in many sections of the country, the U. S. Department of Agriculture has recently established a new Division of Fertilizers and Agricultural Lime in order to devote more attention to this important phase of food production. The new division is a special section of the Bureau of Plant Industry, Soils and Agricultural Engineering, and is headed by Dr. K. D. Jacob, long an authority in this field.

The implications of this move are obvious. It is indicative of more and more expansion in the fertilizer field and of recognition on the part of the U. S. D. A. of the important significance of the wider use of chemical fertilizers in modern agricultural methods. Our guess is that as time goes on, even further divisions may have to be created to keep up with expansion. This implied government estimate of the expanded future of the fertilizer industry is gratifying.

WITH the end of uncertainty regarding the status of 2,4-D manufacturers under the Jones patents, the industry may now see an increase in the manufacture, sale and distribution of this weed killer. Since early in 1946 at which time litigation started between American Chemical

Paint Co., and Sherwin-Williams Co., the industry for the most part has proceeded with caution in its development of the product, not knowing whether heavy penalties for infringement might come at a later date.

Now Sherwin-Williams Company reports a settlement out of court in which the government and the public are given a free license to make and use, but not to sell, compositions covered by the patents. Licenses will be granted upon request to any responsible party who desires to manufacture and sell 2,4-D. A royalty of 2 percent of the net selling price is named, with minimum and maximum figures set at $250 and $10,000, respectively. Distributors, retailers and other resellers of 2,4-D need no license to sell the material purchased from licensed manufacturers.

Thus is removed speculation on what will happen to firms who have been manufacturing the material, and others who wish to begin. It is good to have the atmosphere cleared, but unfortunate that the litigation deadlock had slowed the general progress of 2,4-D for so long.

THE U. S. Department of Agriculture in a recent bulletin, estimates that insects destroy stored grains to the amount of $350,000,000 annually, and that rats and mice account for another $200,000,000 loss each year. The bulletin points out that although 100 percent control of these pests may not be practical, existing methods for prevention of losses of grain from insects and rodents are in use on farms to the extent of only 5 percent of the storage capacity. Yet, farm buildings take care of 97 percent of all the corn, 60 percent of all the wheat, and 94 percent of all the oats stored in the U. S.

The U.S.D.A. points out various methods of pest control in stored grains, and recommends the use of residual-type insecticides in empty bins as well as dusting, and fumigation. For control of rodents, red squill baits and Antu are mentioned as being effective. It would appear that such measures for the preservation of grains would be both sensible and effective if taken seriously by growers in the grain belts. The next job is to sell them on a wider use of the proved protective materials.

DAMAGE from the careless use of weed killers may be far more serious than the crop losses involved. Recent reports of widespread injury to southern cotton acreage from drifting 2,4-D applied from the air include word of an appeal by Senator John L. McCellan of Arkansas to the Federal Trade Commission against unregulated use of the chemical. He claims that severe losses have been experienced by Louisana, Texas and Arkansas cotton growers as the result of 2,4-D applied to adjacent rice fields.

That a rash of local and state legislation may develop following reports of such crop injury is quite apparent, just as almost happened in the case of bee losses from insecticides on the west coast. Not only is the usefulness of this valuable herbicide likely to be hamstrung by such laws, but it may be assigned unfairly a reputation as too dangerous for ordinary use when in reality carelessness is the culprit.

While a long-range effort is being made to solve this drift problem, we feel that the first steps to minmize further damage can begin immediately. Every package of 2,4-D formulation ready for dilution and application should carry a warning ticket on the container seal which cannot be missed by the user whether he be custom-sprayer, grower or somebody else. Then, the close word-of-mouth contact of the dealer, distributor, local formulator, experiment station, and co-op with the ultimate user can be enlisted to spread the word of warning. Every dealer can help,—help to prevent crop damage and loss of his profitable 2,4-D business,—by warning every buyer on every sale. The concerted efforts of several thousand dealers can do more to prevent careless use and subsequent crop damage than all the laws in creation. If you are a dealer, read the manufacturers' warnings on the label and pass them on by word of mouth to your customers. Used correctly, 2,4-D is a valuable adjunct of agriculture, but, like a sharp tool, its misuse may be dangerous and costly.

Pesticide Labeling Problems

Manufacturers face complex labeling pattern . . . difficulty in balancing between "tell all" requirements and presenting attractive packages for high saleability.

by

Dr. C. L. Smith

Agricultural Insecticide and Fungicide Ass'n.
New York City

FEW industries have to work under such a mass of laws and regulations as manufacturers of agricultural insecticides and fungicides. Few must have so wide a background knowledge of their products before marketing them.

And yet, while manufacturers of insecticides and fungicides have sometimes resented all this, they have often voluntarily gone beyond the strict letter of legal requirements. Many have been voluntarily coloring any highly toxic white powdered products, so that no one could reasonably mistake them for foodstuffs. Members of the AIFA have endorsed the MCA precautionary labeling program for hazardous compounds, and cooperated in gaining its acceptance; only now are such regulations being written into the State and Federal laws. Altogether insecticide and fungicide manufacturers have done a great deal to protect the consumer, over and beyond the letter of the legal rules.

It seems not so long ago that we had only a few staple and more or less simple products. Today we have a wide variety of new compounds and new formulations; there has been tremendous growth and change. Let us look at the contrast:

Fifteen or 20 years ago a manufacturer employed a good chemist, and that was all he needed. If his product was a poison—and it invariably was—he labeled it so. If the State Experiment Station said it was effective for a particular purpose, he made such a claim on his label. The rest was up to the sales department.

Today the basic producer still must have chemists, but he also needs entomologists, plant pathologists, agronomists and toxicologists and other specialists. Some of these will be on his full-time payroll; the others must at least be accessible.

Today the Experiment Station still gives essential aid in new product development, but mainly as a field testing station where the all-important problems of variation in performance and relative effectiveness can be determined. The great bulk of the fundamental work before that point is now done by the manufacturer. And what makes the Experiment Stations help still invaluable—but after the product is developed—is an example of another great change in industry practice. I refer to the fact that standard practice now is to have a product tested in every area that has distinct climatic, weather and soil conditions. Many products have had to be tested in practically every local area where they are to be sold.

All these things indicate some of the social responsibility our industry has had to assume: for the safety of the user; for the product's effectiveness under all manner of conditions of use under which it is recommended —and for distributing and stocking the product close enough to the potential pest outbreak, and in sufficient quantities.

Most manufacturers do still more: they assume the responsibility for supplying enough information with the package to enable a local remixer to formulate and re-market. And with the host of new materials, still more attention is being given to this. More and more the remixer is becoming an important part of the distribution system. Since he usually does not have the equipment and staff to do his own formulating and labeling, the basic producer now furnishes the information needed.

In an effort to make this talk

*Address given at A.I.F. Annual meeting, Spring Lake, N. J., September 3, 1947.

represent a cross-section of the industry on labeling procedures, I have talked with a number of companies. Let me trace a hypothetical product through a typical producing company, to show the efforts to insure proper label information on a new product:

Progress Traced

WE start at the point where the chemical first shows promise for controlling some pest. The first label may require nothing more than a code number for screening purposes. Experimenters are warned to handle the material with extreme caution. Test samples are distributed not only to the producer's technicians but also to toxicologists, for more information on the possible hazards in use. That is important just as early as possible; in fact the producer tries to have detailed toxicological information on the label before his product is shipped at all to outside experimenters.

Where these tests are not complete (and the chronic toxicity data requires a long time to complete) the experimental sample usually carries a general warning somewhat like this:

> "Caution! The chemical, physical and toxicological properties of this product have not been fully investigated and its handling or use may be hazardous. Exercise due care."

If the toxicologists have had experience with somewhat similar chemicals, the producer may draw upon that experience for additional warnings, in anticipating possible hazards.

Then the production division decides on the manufacturing facilities, and the sales and other divisions consult on the plans for merchandising. This means a somewhat more elaborate label. It still may bear only a code number rather than a final trade-name. It reads "For Experimental Use Only." Since the product is now going to outside investigators, the label now identifies the product as to its nature—that is, "an insecticidal composition." It bears an ingredient statement to indicate the strength. And it bears as much precautionary warning information as knowledge permits.

THIS brings us to the point where the product can safely be submitted to the Experiment Stations for testing. The Stations and field investigators are to determine the product's effectiveness as a control agent. But in order to provide complete background for the final label, they also are urged to report as quickly as possible all hazards they encounter. This includes injury to plants, as well as any harmful effects on humans and warm-blooded animals.

And don't forget that during all this time, the sales and advertising departments are beginning to press for information. They want to get started; they don't like so much waiting.

After all the experimental work is completed, the product is ready to be sold—either for limited use or on a fully commercial scale. In either case a complete label is now needed. Some company division, usually the production department, is assigned to accumulate all the necessary information for this. The data needed includes the generic name for the product, the chemical information for an acceptable ingredient statement, the proper precautionary statements drawn from toxicity studies and from field investigations, and the directions for use.

Directions usually cover the pests to be controlled, the dilution and rate of application, the timing, and the possible harmful effects from using the new product under normal conditions. All this data usually funnels through the company's own technical staff. Armed with it, the manufacturer now considers actual preparation and layout of a finished label.

Let's inject something here. Suppose that several concerns anticipate marketing the same product, as with benzene hexachloride or chlordane. In that case, many of the labeling problems can be solved more quickly by cooperative effort. Such cooperation worked out in the case of these chemicals, on such things as an acceptable name, ingredient statements and precautions. Claims and directions for use, of course, were left up to individual producers. But by working together and sharing information it was possible to label properly and hence to get on the market with this new product much sooner.

Returning to our individual producer, we are now at the stage where the legal department must be called in—because all matter required by law must be listed, and over the United States there are many laws.

We now have to find agreement among the sales, legal and advertising departments. One is concerned about the amount of information necessary to protect the consumer. Others are anxious to put every conceivable precaution on the label. All must agree on the name, display and typography. Some will want to load up a small label with too many claims and too detailed directions, forgetting that when you reduce a big label to small size for a small package it must still be legible. Zealous enforcement officials may incline to make the labeling requirements so complex that the package will not be attractive and will not sell. The producer must strike a balance somehow.

Label experts agree that at this point, company management may well heed a few don'ts:

Don't ever assume with a new product that any label you are preparing is final. Developments will require constant change. Therefore don't print too many labels until your product's use is well established.

Don't let sales enthusiasm exaggerate your claims.

Don't let the experimenter propose too extravagant directions for use. They must be based on tests that are authentic and proven.

Don't neglect to allow for regional variations.

Don't forget that the relative display of the required information is just as important as the information itself. Most of us may never read the fine print in our insurance policies—but we want the user to read all that we put on our labels.

Don't forget that most producers have found it advisable to

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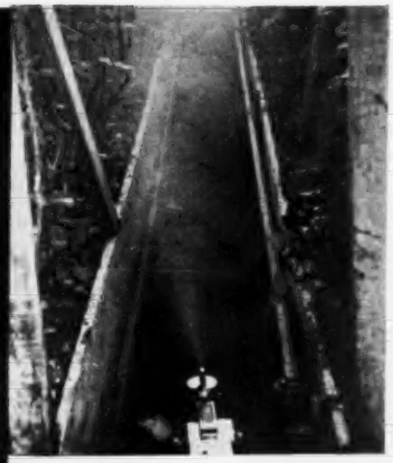


Pictured at the right are a number of examples of "Vapo-Difusion" used in greenhouses.

At the top correct placement of applicator is shown. Note how direct line of spray is away from close contact with plants.

Next photo shows the same greenhouse being filled with vapor from the diffuser.

Next to bottom photo illustrates diffuser connected directly to cylinder of compressed gas for use in greenhouse.

Lower photo shows home-made diffuser which is used successfully. It uses compressed air as a propellent.

SINCE the discovery in Germany of the insecticide hexaethyl tetraphosphate (now more properly identified as tetraethyl phosphates) and the advent of its manufacture in the United States, a considerable amount of research and experimental work has been done with the material. It is the purpose of this article to describe a method of using this product as an insecticide which has given satisfactory control of pests on greenhouse plants. Application procedure in this article will be referred to as the "Vapo Diffusion Method." This will serve to differentiate the method from the aerosol and mist methods of application.

This method consists of dispensing the insecticide into a closed area through a venturi type nozzle with compressed air or equivalent acting as propellant. An ordinary glass jar beneath the nozzle with a feed tube serves as a holder for the insecticide. All work referred to in the following discussion has been done with commercially formulated tetraethyl phosphates. This is a vapotone formulation containing 9 per cent of tetraethyl phosphates plus other organic phosphates and organic solvents and wetting agents.

The use of material extended with organic solvents has given the most satisfactory results for this method of application. The extension by the solvent appears to have desirable effects on the volume of vapor as well as its distribution and

*Chief Research Entomologist, California Spray-Chemical Corp., Richmond, Calif.

Insecticide dispensed through venturi-type nozzle with compressed air or similar propellant . . . pressure of from 100 to 150 pounds has proved most desirable

stability. Most satisfactory results have been obtained with fairly high pressures when diffusing the material by means of compressed air. Pressure of one hundred to one hundred fifty pounds is most desirable. Best results have been obtained with one nozzzle applications discharging from several locations in greenhouses too large to be treated from one stand. The diffuser or nozzle is placed on or near the ground or floor of the house so that vapors rise beneath plants or benches and gradually disperse throughout the atmosphere.

Direct contact on plants by materials coming from the nozzzle should be avoided. For this reason the diffuser must be placed some distance from plant or between rows, or under benches. Plants too near the discharge nozzle should be screened off with a canvas sheet to protect them. Although most of the material is dispersed as vapor, slide tests have shown droplets up to 20 feet from the nozzle. The amount of material used has been varied in different locations, but a standard dosage has been adopted: one-fourth pint of formulated 9 percent tetraethyl phosphates to each one thousand square feet of floor area in a greenhouse. Roof height is not taken into consideration as this dosage is adequate for greenhouses of average height. Greenhouses up to forty to fifty feet in width and one hundred fifty feet in length can be treated from one stand of a diffuser. This stand should be in the center at one end. Houses longer than 150 feet should be treated from both ends. In addition, treatment in the center of a house is sometimes necessary. Wind currents outside of houses must be taken into consideration in the selection of the point for release of the vapor.

At 100 to 150 pounds air pressure, the insecticide is diffused out of the apparatus at the rate of about one pint of material every five minutes. In order to increase the amount of vapor aand effect a more rapid saturation of the atmosphere, an equal amount of water may be used with the insecticide. This is not essential but in some cases has proved advantageous. Dilution of the material to a further extent is not advisable since excess moisture causes condensation on foliage and hazard to plants. The use of air pressures as high as recommended is valuable not only for rapid diffiusion and vaporization of the insecticide, but also as an aid in vapor dispersion. Higher pressures produce convection currents resulting in more rapid dispersal of vapors. Allowing compressed air to flow through the nozzle for a few minutes after the liquid has been dispersed further aids dispersal of the vapors.

Equipment for production of compressed air or adequate pressure for insecticide diffusion may be of two types. Most satisfactory equipment is a power operated air compressor capable of producing pressure up to 130 to 150 pounds and holding this pressure continuously. Alternate types of equipment for providing adequate pressure are cylinders of compressed carbon dioxide or oxygen. Considerable work has been done with cylinders of both gases, but the use of compressed air has proved the most practical. Both gases work well but both have disadvantages. Among the disadvantages of oxygen are its cost, unavailability and possible explosion hazard. Chief disadvantage of carbon dioxide is its tendency to freeze up which retards dispersion and causes pressure fluctuations. For the use of any method of dispersion, compressed air, oxygen or carbon dioxide, the use of adequate and proper gauges on all equipment is necessary. The insecticide should be liberated as rapidly as possible with plenty of pressure in order to fill houses completely in the shortest possible time. This builds up vapor concentration without undue loss of vapors due to air currents or leakage. Adequate air pressure and proper placement of diffuser cannot be too strongly stressed for satisfactory and efficient use of the "Vapo Diffusion Method" of insecticide application.

Plants treated successfully by this method have included such commercially grown greenhouse plants as orchids, roses, carnations, gardenias, etc. In some greenhouses, such as nursery establishments, wide varieties

Table 1

RED SPIDER MITE CONTROL ON ROSES UNDER GLASS

Test No.	Live Spider per 25 leaflets before treatment	Live Spider per 25 leaflets after treatment	Percent Mortality
1	228	3	98.7
2	177	5	97.2

Controls—No population reduction in untreated houses.

of plants have been treated. These have included chrysanthemums which were treated without injury by this method. The total list of experimentally treated varieties includes well over 100 species of plants. Various commercial greenhouses up to the time of this writing have had 6 or more successive treatments by the fumigation method with completely satisfactory results, with favorable plant reaction.

Successful application largely dependent on adequate air pressure and proper placement of diffuser . . . over 100 plant species treated successfully in experiments so far

Insect Control

INSECTS controlled by this method have included the common species generally infesting greenhouse plants. Aphis [*Macrosiphum rosae,* (Linn.] and other species have been controlled completely and in many tests where aphis have been numerous, it has been impossible to find live aphis after the fumigation treatment. At the concentrations used, this method is extremely effective for control of aphis in greenhouses.

Mealybugs have been well controlled in some cases by fumigation with 9% formulated tetraethyl phosphates. One greenhouse containing orchids (*Phalaenospsis*) with a fairly heavy infestation of the long-tailed mealybug [*Pseudococcus longispinus* (Targioni)] was cleaned up by three fumigations so that only an occasional mealybug could be found. Best results are obtained in mealybug control if the initial treatment is repeated in two or three days. The second treatment has somewhat of a knock-out effect following the initial softening up treatment. Favorable results have been obtained also against mealybugs on gardenias. Counts from some tests against mealybugs on gardenias are included in Table 2, this page.

On red spider mites [*Tetranychus telarius* (Linn.] and *Tetrabimaculatus,* Harvey) as well as other species, results have been excellent where follow up treatments have been made for unhatched eggs. Occasional live mites can be found after treatment and hatch of young mites from eggs may occur shortly after treatment. So far there is no evidence of control of red spider eggs with this treatment. Some typical counts of red spider tests are included in table 1. With follow up treatments, control has been commercially complete.

Other insects observed to be controlled by this method of treatment were various adult moths, some caterpillars, ants, springtails (*Collembola*), flies, mosquitos and roaches. Control of other species not mentioned is also possible and will be evaluated in future investigations. Rats and mice were also killed by the same treatment indicating usage in warehouses, on ships, etc.

Precautions concerned with the use of this method of treatment have been developed in progress with the work. Operators without gas masks and protective clothing should not enter houses while vapors are being liberated or when air is saturated with vapors. An adequate type gas mask is any chemical warfare type. In addition to his wearing a gas mask, the operator's skin should be protected by covering exposed areas before coming into contact with the vapors.

Summary

A METHOD of insecticide vapor dispersion has been described which consists of vaporizing insecticidal material through a venturi type nozzle with compressed air or compressed gases.

"Vapotone" Insect Spray consisting of 9% formulated tetraethyl phosphates applied by the "Vapo Diffusion Method" has given excellent control of aphis and red spider under glass. Good control of mealybugs has also been obtained in greenhouse tests. Numerous other insects have also been controlled in this manner. Application of other insecticides by this method is possible but is not discussed in the article. The use of other types of nozzles is also possible.

Chief advantages of using the "Vapo Diffusion Method" include economy in cost and labor, rapidity of treatment and plant safety.★★

Table 2

MEALYBUG CONTROL ON GARDENIAS UNDER GLASS

[*Pseudococcus Maritimus* (Ehrhorn)]

Live Mealybugs per 40 tips before treating	Live Mealybugs per 40 tips after planting	Percent Mortality
213	49	77

Controls—No population reduction in untreated houses.
The data in table 2 is based on one treatment only.

APPLICATION of chemicals to the leaves of plants to cause their defoliation is a relatively new practice. This is somewhat surprising, in the light of an old and familiar observation that the shock of frost, or excessive application of certain chemical fertilizers and insecticides, will cause foliage to die and later fall from the plant. Though it was well-known that natural processes serve to rid the plant of this injured foliage, the practical possibilities of a procedure expressly for the removal of leaves did not become fully apparent until about ten years ago. At this time, mechanical harvesting machines were receiving serious attention and undoubtedly proved an important factor in bringing to focus the need for a satisfactory material to be used in the defoliation of cotton.

From the start chemical defoliation was considered to have great possibilities for cotton, the most important single cash crop grown in the United States. Cotton specialists were sure that both hand and mechanical harvesting would be faster and easier if cotton leaves could be removed uniformly and quickly at the time desired before picking. The late bolls, exposed to air and sunshine, would open quickly to allow the whole crop to be harvested at one time. Many obvious advantages aside from easier picking woud be gained in this manner. The time of harvest could be scheduled as desired for efficient use of labor and damage from bad weather and frost could be avoided. Instead of waiting for nature to take its own good time in maturing the crop, why not find an effective chemical aid?

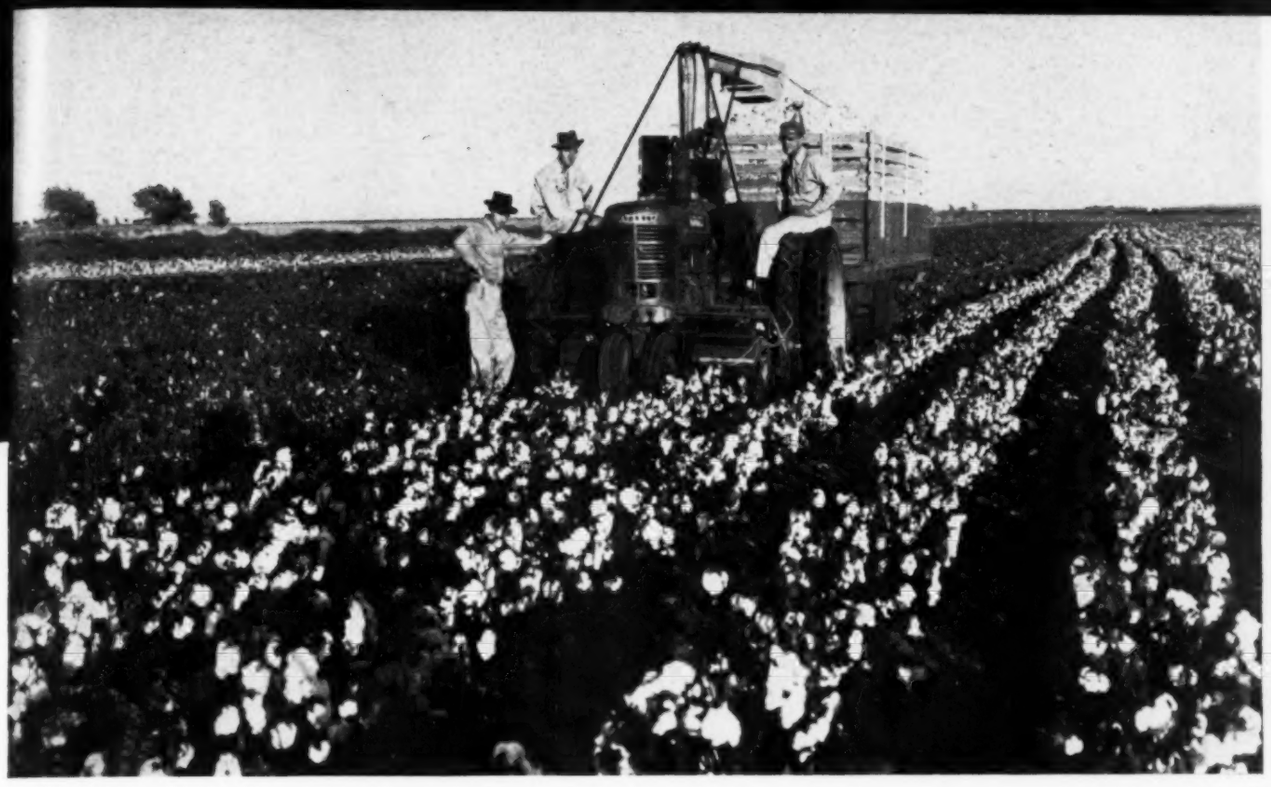
The problem was attacked with vigor and in the subsequent investigations, numerous chemicals and combinations of chemicals have been tested to determine their possible value as defoliating agents. Out of many materials tested, a very few have proved effective. The list has been reduced further by consideration of cost handling qualities and other factors which affect the acceptance of a new product.

One material which has become quite important commercially is a chemical dust in which calcium cyanamide is the active ingredient. Sold under the trade name of "Aero Defoliant Chemical Dust," * this product has been used extensively in the defoliation of cotton during the past several seasons. Its use has been extended, in the meantime, to a number of other crops for which more efficient production is attainable through timely defoliation.

Soybeans to be harvested for seed

Cotton field after defoliation test. Perfect jobs such as this provide "easy picking" for either hand labor or mechanical harvesting machinery.

* A product of American Cyanamid Co., New York.



This field in West Texas was dusted with Aero Defoliant before mechanical stripper went to work. It is no longer necessary to wait for frost to take leaves off.

are not satisfactorily combined until the leaves fall from the plant, which for most varieties in northern areas means waiting for frost. This delayed harvest is undesirable because it is usually too late for the timely seeding of cereal crops which follow in the rotation, and because bad weather may set in to damage the crop or even make its harvest impossible.

Defoliation of tomato plants, after the fruit is full-sized, greatly hastens ripening without reduction in yield and prevents crop losses due to unfavorable weather. The weather factor is particularly important in the northern states and in West Coast areas where a large percentage of fruits may not ripen before frost.

Ramie, a promising new fibre crop in the South, is being defoliated successfully with "Aero Defoliant." As a result, harvesting as well as decortication is a much easier process. Fruit tree nursery stock which requires hardening before storage has also responded well to chemical defoliation. Preparation for storage will be greatly simplified, if the procedure can be further perfected for a wide variety of nursery and ornamental plants.

In the case of potatoes, complete killing of the tops shortly before digging time is now widely practiced. "Aero Chemical materials are used effectively to kill back the entire vine growth, a procedure which contrasts with mere defoliation in which only the leaves are affected.

Defoliation, a Natural Process

THE process whereby plants shed their leaves is comparatively simple. It occurs normally after maturity of seed and fruit, and when growing conditions are no longer favorable. At this time, and whenever a leaf ceases to perform its function, the plant grows an abscission layer (Latin: *ab* — off, plus *scindo* — to cut) across the juncture of the leaf petiole and the plant stem, allowing the leaf to fall. Ripe fruit is dropped from the tree or plant in this same manner. The cotton plant is an excellent example of one which retains foliage long after it is of any value in growing the crop or increasing the yield. In fact, the foliage of cotton and a number of other crops is frequently the cause of crop losses in late season. The ability to remove this foliage has proved important because it results in earlier maturity, easier harvest, and, in many cases, helps eliminate harmful insects and diseases.

The action of these chemicals on foliage is much the same as a light frost or freeze. The chemical dust shocks the leaf cell structure to disrupt normal metabolic functions, and produces a degree of injury comparable to the rate of application. By careful control of application rate the leaf can be injured just enough to cause growth of an abscission cell layer, which allows the leaf to drop from the plant. Excessive applications stop cell activity in the leaf too abruptly and tend to freeze the leaf to the plant.

Although scientists are still working to improve their understanding of the whole process of defoliation, the requirements of a good defoliant are now quite apparent. The important point in defoliation of cotton, soybeans and certain other crops is to remove the leaves without damaging the plant or its fruit. Fortunately, the effective defoliating chemical formed on the leaf from the breakdown of "Aero Defoliant" is very unstable and short-lived, undergoing a further change into a chemical that is not toxic to the plant. Only those leaves receiving some of the dust are affected. The application is made at a rate no greater than that determined necessary by careful experiment to remove the leaves of the particular crop. The seed or fruit

is not injured. The main stem and root system of the plant are also left uninjured, and serve to carry fruit more quickly through a normal ripening or maturity.

Advantages to Cotton Grower

ANY machine or procedure that will enable cotton to be harvested early will increase materially the value of the crop. This fact is well recognized by everyone concerned with the production of this important fibre. Cotton authorities state that cotton quality is reduced one grade for every ten days that open bolls are exposed to rain or sunshine. Defoliation chemicals applied at the low rate of 20 to 40 pounds per acre work so effectively under favorable conditions that picking can be scheduled five to ten days after it is applied. Grade loss due to exposure is thus eliminated or greatly reduced.

Loss of cotton through boll rotting is a serious hazard to the cotton grower under conditions favoring a rank growth. Boll rot loss, affecting frequently 25 to 50 per cent of the entire crop, may be prevented by timely defoliation. The cotton bolls open up promptly, and receive the necessary air and sunshine to prevent rotting.

Mechanical harvesting became increasingly important to the cotton grower during the war years, when a great amount of farm labor moved into industry. Defoliation has added greatly to the efficiency of the mechanical picking and stripping machines. Although the mechanical picker may be used before the maturity of the crop to harvest those bolls already opened, green leaf stain of the fibre is a serious problem and a second trip through the rows is necessary to harvest the late maturing bolls. Because the mechanical stripper is designed to strip the entire plant of mature and unopened bolls alike in one operation, obviously it should not be used until the whole crop is matured and free of leaves. The quality of cotton, mechanically harvested, may thus be improved as much as one half grade or more by a good job of defoliation. More efficient use of equipment and labor is possible because a big crop may be defoliated and matured only as fast as available machines can take care of it. Defoliation can be started as early as 25 days after setting of the last bolls that will make cotton.

Cotton picking, by hand labor, becomes faster and easier when the foliage is removed and all bolls are opened uniformly. Tests indicate that hand pickers can harvest 20 to 60 per cent more cotton after it is matured by defoliation.

Boll weevils and other pests depend upon the green leaf for sustenance, and it has been well demonstrated that defoliation may be an important contribution to their control. Defoliation destroys the food on which the late broods of boll weevils live. The weevils go into the winter half starved, and, as a result, a large percentage do not survive exposure to the winter weather. Honeydew, the troublesome sticky substance produced by aphids, may likewise be reduced by defoliation. Honey-dew serves as a medium for sooty mold which lowers the grade by discoloration and weakening of the fibre.

It is the opinion of many growers who produce cotton under irrigation that maximum yields have not been attained. The large amounts of water and fertilizers required for highest yields have not been used because they would cause excessive foliage growth. With the assurance that excessive foliage can be eliminated as desired after the cotton is made, these growers believe that a marked increase in yield is easily possible.

Aid to Soybean Production

THE Ohio Agricultural Experiment Station first conducted experiments with "Aero Defoliant" Chemical Dust in 1943, to determine its practicability for the soybean crop. This and subsequent field experiments showed that the soybean can be defoliated, and that the practice is an important aid in harvesting the seed.

The combine is normally used in harvesting soybeans. It cannot be used efficiently, however, until most of the leaves have fallen from the plant and the beans are fairly well dried. Weeds still carrying their foliage are also a hindrance to combining. An application of 75 to 100 pounds of "'Aero Defoliant' per acre is effective in defoliating soybeans, and will cause no reduction in yield or quality of seed if it is applied any time after the seeds lose their green color. Defoliation results in a rapid drying of the soybeans until their moisture content is low enough for harvesting and safe storage. This low level of 13 to 14 per cent moisture is not reached while the green foliage is still drawing moisture from the soil through the plant.

Chemical defoliation thus provides the soybean grower with a fair assurance that harvesting can be safely advanced a few weeks, to avoid damage from bad weather in late season. This earlier harvest has a further advantage because the land may be cleared soon enough for the timely seeding of the small grain crop, which normally follows in the rotation.

More Profitable Tomatoes

A GREAT deal of effort is concentrated by the tomato grower on methods of producing and maintaining a vigorous, healthy foliage. Obviously, this is the first requirement for producing a satisfactory

Defoliation destroys food supply of late boll weevil, reduces grade loss of cotton due to exposure, valuable in preventing cracking of tomatoes...kills potato tops to hasten maturity, gives tuber tough skin

(Left) Timely defoliation of tomatoes can prevent lowering of quality due to cracking. (Right) Defoliation allows fruit to get air and sunshine, thus hastening maturity of the crop.

yield. However, in much of the northern tomato growing areas, it is normal for a heavy foliage to remain on the vines until late in the season, with the result that frost or freeze occurs before the crop can ripen. Cool seasons with heavy rainfall are especially conducive to this situation.

Repeated field tests have demonstrated that tomatoes can be defoliated after the corp is made or when the hazards of weather justify, by a chemical application of as little as 30 pounds per acre. Larger applications may be used without causing any injury to the fruit. Reducing the foliage by this method hastens the ripening of the exposed fruit, and may thus reduce or eliminate severe losses from damaging cold weather. In the northern part of the United States and in Canada, it is not uncommon to find 2 to 5 tons per acre of unripened tomatoes in the field at the first killing frost.

It has been observed that defoliation may reduce to a minimum the cracking of fruit, resulting from excess moisture in both green and ripe plants. A firmer fruit with better keeping qualities is also possible by partial defoliation. A slight dehydration of the ripening fruit occurs after defoliation, to give a tomato which holds up better until it is canned or sold on the market. In addition to these important effects on the quality of the tomato crop, harvesting is made easier and more attractive to the laborers since the fruit is easy to find and gathered in fewer pickings.

Kill Potato Tops

THE use of chemicals to kill potato vines after the tubers are matured has become increasingly important to the potato grower. The object in the case of potatoes is to eliminate promptly the entire vine growth as soon as this step is warranted by such considerations as weather conditions, prevalence of disease and pests, price trends of the early market, and availability of labor to carry out the harvest.

Many farmers in northern areas have adopted the procedure of potato top killing in order to avoid early frost injury, or in order to utilize labor while it is available and when working conditions are most favorable. This need for top killing is becoming increasingly apparent with the recent use of more effective insecticides and fungicides, which serve to keep the vines green much later in the season. DDT alone has been notably effective in this regard. Yields have been increased to a marked extent, but not without delaying maturity and conditions suitable to harvest. By chemical top killing, the date of harvesting can be advanced as desired. Elimination of heavy growth of vines, and in many cases weeds or grass, greatly facilitates the use of mechanical harvesters and makes easier the job of picking by hand labor.

The late blight disease is a serious problem to potato growers in most of the areas where potatoes are produced. It is a menace to the producer of certified seed and to the commercial crop also, since tubers infected with the blight organism are subject to rot which may cause severe losses in storage or in shipping. If the potato foliage is eliminated a short time before digging the potatoes, the blight organism will be eliminated to a high degree also, since it requires the green plant as a host on which to maintain itself. Virus diseases are a matter of great concern to the producer of certified seed potatoes. To prevent the spread of this disease by aphids, the commercial seed grower resorts to prompt chemical killing of the potato tops.

Feathering or skinning of the immature tuber is a problem related especially to the market quality of potatoes from the Eastern Shore and the South, where the early crop is produced. Killing the potatoes a week or ten days prior to harvest hastens maturity, and produces a tuber with a tougher skin which withstands handling while being harvested and shipped to market. This advantage is also considered important by the northern grower who wants to produce an early-matured seed for shipment to Florida and Texas.

A wide range of materials have been tested to determine their suitability as top killers. Several materials have been found which will

(*Turn to Page* 70)

F.A.O. Studies

RODENT CONTROL

PART II

THE Food and Agriculture Organization of the United Nations met in London August 5-12 to study control of pests which attack and destroy foodstuffs in storage. The October issue of AGRICULTURAL CHEMICALS *carried Part I of a report of this meeting. This issue continues a digest of papers presented covering rodenticides and insecticides. The official F.A.O. recommendations for an international insect control program are also included.*

"RODENTS AND RODENT CONTROL IN THE UNITED STATES." (E. R. Kalmbach, Director, Wildlife Research Laboratory, U. S. Dept. of the Interior, Denver, Colo., U.S.A.) A critical and able review, taking into account both rat proofing (rat exclusion by adequate building) and rat reduction by concentrated control.

Red squill, the powder derived from the dried and ground bulbs of *Urginea maritima*, is looked upon as the safest of rat poisons for use by the public and even by pest control operators in thickly settled communities. Although during and even previous to the last war the toxicity of red squill imported to the United States was not sufficiently great to permit its direct use in rat baits, a process of "fortification" perfected by the U. S. Fish and Wildlife Service permitted the use of much of the low-grade powders. Extracts of the toxic principle are added to stipulated quantities of the same low-grade powder to yield a product that has a toxicity to laboratory rats of 300 to 400 mg/kg. Initial steps have been taken also to introduce red squill as a harvestable crop in Southern California, where bulbs of adequate toxicity already have been grown.

Barium carbonate is less extensively used than formerly while sodium arsenite never had widespread use in the United States. Phosphorus has been used extensively in commercial rat poisons, but it is considered particularly dangerous because no effective antidote is known. Arsenic trioxide, pulverized to the point where it will pass through a 200 mesh screen, has proved much more effective than coarser powders. If the finer grades were more generally available, this poison unquestionably would have increased in use both in food baits and water solutions.

During the war when supplies of effective red squill, as well as importations of strychnine and thallium were at a low ebb, zinc phosphide served as a valuable stop-gap poison in the control of certain field rodents as well as rats. Its popularity waned rapidly, however, when the recently-developed raticides, alphanaphthylthiourea and "1080" (sodium fluoroacetate), came into use.

Thallium, which has been in limited supply ever since European sources were cut off during the war, is highly toxic and effective against rats but must be used with extreme caution by the operator. Because of its comparative scarcity and high cost it may never become a serious competitor of the modern poisons mentioned.

Alphanaphthylthiourea ("ANTU") developed during the war, is enjoying increased use against the Norway rat, both as a food poison and, when diluted with inert material, as a dust applied to runways and burrows. Whereas it is a reasonably safe poison to use in settled communities, it must be used wisely because of its toxicity to a number of domestic animals.

Mention should be made of the highly toxic "1080" (sodium fluoroacetate). This material, demonstrated as an effective rodenticide through research carried out by the Fish and Wildlife Service during the war under a grant of funds from the Office of Scientific Research and Development, is now extensively used by governmental agencies and competent pest control operators. Its high toxicity dictates that it should never become available to the general public. It is readily accepted both in food baits and in water solutions, but its hazards to pets and domestic stock through "secondary poisoning" are outstanding. In settled communities it can be used only under condi-

tions where pets, particularly dogs, are excluded. At the present time the sale of compound "1080" is restricted to those competent to handle it.

Fumigation is used extensively at ports of entry for the control of all types of vermin and this of course, includes rats and mice. Hydrocyanic acid gas is most frequently employed; methyl bromide has less application, while carbon bisulphide, which is widely used in California in field rodent control, possesses a fire hazard that precludes its general use indoors. Carbon monoxide has use under field conditions and certain outdoor storage installations. Certain gaseous phosphorus compounds also have been generated from the combustion of "fumigating cartridges," a development of the Fish and Wildlife Service. These also have their primary application in field burrows of prairie dogs, woodchucks, and rats.

The following papers outlined various problems without concerning themselves with specific chemical remedies:

"The Role of Fungi in the Deterioration of Grains in Storage" (A. G. Johnson, Division of Cereal Crops and Diseases, U. S. Dept. Agriculture).

"Modern Construction of Storage Loci With a View to Reducing Loss from Rodents, Insects, etc." (William V. Hukill, Sr., U. S. Dept. of Agriculture). This was an excellent paper for those interested in the protective and conservative aspects of agricultural engineering as applied to storage problems.

"Some Needs for International Co-operation in Research and Its Application to Problems of Insect Control." (Dr. Charles E. Palm, Cornell University, Ithaca, New York.)

The agricultural chemical industries and equipment manufacturers, said Dr. Palm, are contributing materials through their research and development programs. New chemicals such as DDT, benzene hexachloride, chlordane, hexaethyltetraphosphate and others are evidence of the rapid advancement being made by industry in producing highly efficient insecticides for many uses. New methods of applying these and other materials by means of high velocity air blasts, high volume-low velocity air streams, concentrate sprays from airplanes and the like, all offer an opportunity for expanded use of chemicals in insect control and furthermore, for many problems which heretofore have been impossible to consider. The evaluation and ultimate use of these various materials and methods can be hastened materially by cooperative research among nations having similar insect problems. In addition, the technical service developments of some of the major insecticide industries will add trained personnel to the field of specialists who can help demonstrate these products and work with their adaptation to areas of the world where they may be of service.

F.A.O. Recommendations

IN the past fifty years many injurious insects have been introduced through commerce into countries where they were previously unknown, and have now established themselves. Although preventive and control action is being taken in some countries, the fight must be continued until action is taken on a global scale. The delegates were of the opinion that much can be done without further research, but that special research relating to the use of synthetic insecticides, rodent control, and to the problem of grain drying should be accelerated.

In view of the foregoing, therefore, the assembly of FAO delegates passed a resolution unanimously recommending that:

(1) All Member States should maintain, or establish, adequate organizations for the prevention and control of infestation at all stages from farm to consumer, with special emphasis on storage, processing and transport.

(2) Special consideration should be given by all Member States to the provision and training of the necessary technical personnel. Until a more adequate staff is available, progress will inevitably be slow.

(3) That publicity should be used so that producers, handlers, processors and consumers may be informed in the proper care of food.

(4) That Member States should collect information on the losses due to infestation and make the information available to FAO.

(5) That FAO should ensure that an appropriate information service is available to Member States, and that FAO should cooperate with such established institutions.

(6) That FAO should arrange the loan of experts as between Member States for assistance in special problems.

(7) That FAO should arrange periodic conferences of experts, both on a world wide and a regional basis, such as that already operating in Europe, for the joint consideration and exchange of experience and knowledge.

Taking part in the F. A. O. Conference were representatives from Austria, Belgium, Brazil, Canada, Czechoslovakia, Denmark, Dominican Republic, Egypt, El Salvador, Ecuador, France, Greece, Guatemala, Haiti, India, Luxemburg, Netherlands, New Zealand, Norway, Panama, Peru, Poland, Siam, United Kingdom, the U. S. of America, and Uruguay.

Comments on the national and international food situation will be found on the editorial page of this issue.—THE EDITOR.

New Methods for Applying FERTILIZER

by

Dr. Benjamin Wolf
Seabrook Farms, Bridgeton, N. J.

Bulk fertilizer materials applied during fall and winter months . . . cover crop carries plant food and releases it in spring

THROUGH experiments conducted during the past four years, at GLF Seabrook farms, Bridgeton, N. J., new methods of fertilizer application have been developed which promise the farmer cheaper per unit fertilizer with less work and a more uniform release of nutrients in accordance with crop needs. This has been brought about largely by the discovery that fertilizers applied to cover crops in fall or winter are at least as effective for the succeeding cash crop as fertilizer applied directly before planting the cash crop. A "pilot plant" application for 750 acres of peas during 1947 has confirmed the results of experiments carried out during previous seasons.

Numerous advantages have been found in fertilizing the cash crop by applying fertilizer to the non-leguminous cover crop. In the first place, production of dry matter by the cover crop has been increased up to 100%. This apparently has advantages from organic matter economy in soils with resulting better erosion control, improvement in soil structure, etc.

Another important consideration lies in the fact that at least part of the fertilizer applied is absorbed by the cover crop converting cheap inorganic nutrients to more expensive organic form. The release of such nutrients are at a more uniform rate than is possible with applications directly to the cash crop. From the same angle, it is almost impossible to cause fertilizer injury of the cash crop by fertilization of the cover crop even in light soils and with heavy rates of fertilizer. This absence of fertilizer injury often gives a more rapid start with a better root system to plants fertilized via the cover crop. The job of fertilization can be done during relatively slack periods, which is an important factor to busy farmers. Results from one year's experiments on 3 different fields have indicated little or no difference in yields of peas receiving fertilizer on the cover crop in November, December, January or February. Fertilizer was applied whenever weather permitted and

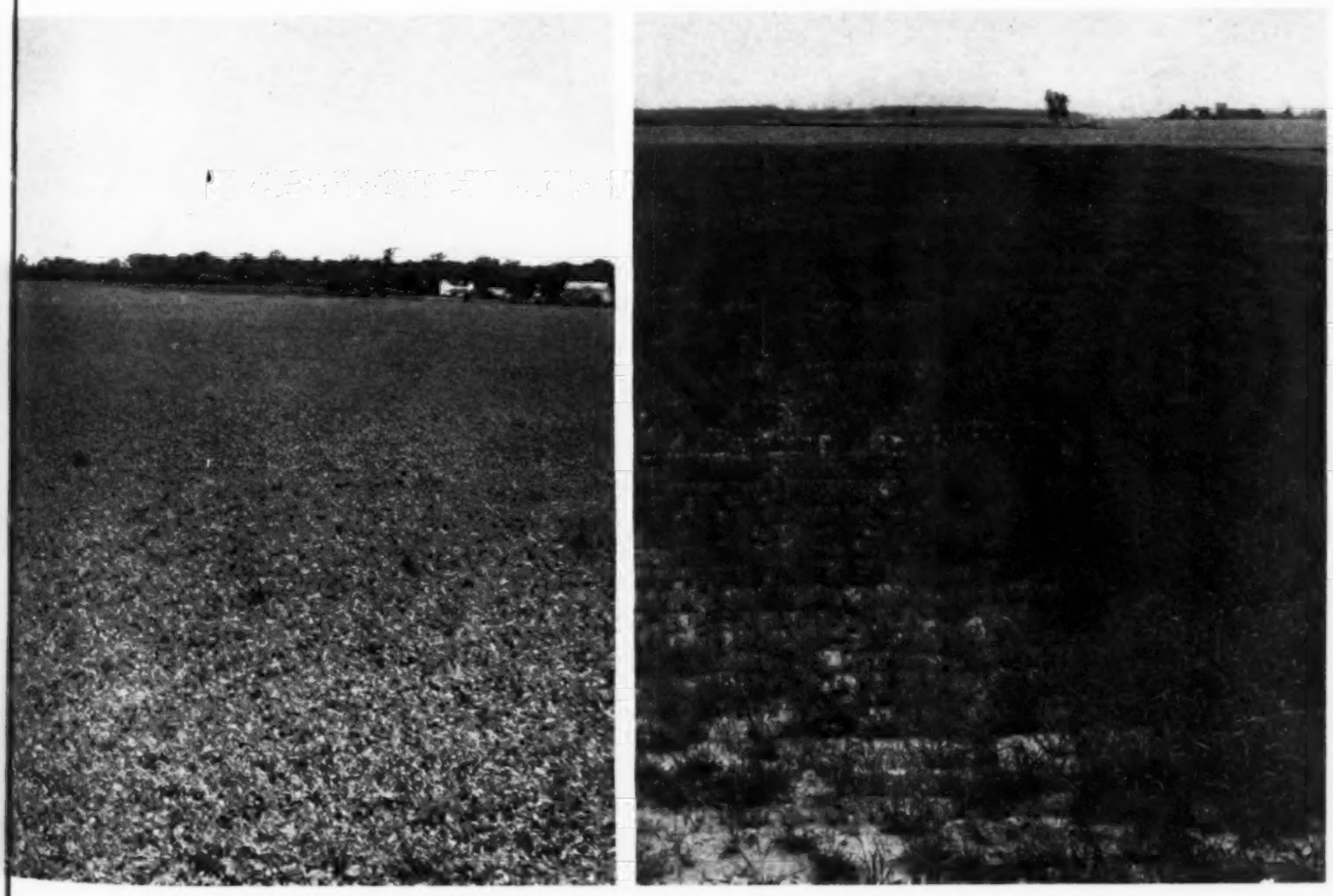
when the soil was not covered with snow. The earlier applications insure better yields of cover crop and less danger of loss. However, there is evidently a relatively long period in the fall or in early or late winter in the New Jersey area when fertilizer may be applied with a good chance for success. At the present time, fertilizer companies are allowing substantial discount for fertilizer moved during this slack period.

Fertilization of the cover crop for the succeeding cash crop lends itself readily to the spreading of bulk fertilizer. By extending the season when fertilizer may be applied, it makes practical use of trucks capable of spreading fertilizer in bulk. Fertilizer in bulk is relatively cheap for it eliminates the expense of bags and bagging, (about $2 per ton) and the necessity of a conditioner (fertilizer is spread on fields before it hardens). Since no conditioning is necessary and fertilizer is used as needed, large storage is unnecessary. Using fertilizer as it is made, reduces costs of handling. All these savings when passed on to the farmer mean that he can often have fertilizer spread on his fields at a cost approximately the same as bagged fertilizer at the farm.

Spreading fertilizer in bulk has proved interesting to many people and its future at least in certain areas, looks quite secure. The Co-op. G.L.F. Soil Building Service Inc., Ithaca, New York, which helped conduct the above studies at Seabrook Farms, has had more than a full year's experience in the commercial application of bulk fertilizer. Such fertilizer has been applied to cover crops, pastures, hay fields, asparagus fields and also plowed fields prior to planting crops.

The actual application of fertilizer is accomplished by loading five to eight tons of fertilizer in bulk on a modified truck. This truck spreader is designed to provide a uniform feed at whatever field working speed the truck is driven. The twin distributing fans are driven by a auxiliary motor to insure a uniform width of spread. The rate of application is determined by the size of the feed gate opening and the width of the "land" the operator selects. Experience in judging the width of the "land" and general operation helps to attain a more uniform distribution.

Fertilizer materials or mixed fertilizers may be used. Mixed fertilizer made up entirely from all granular materials are especially adaptable to bulk fertilizer spreading and there is less difficulty from stand-



Below (left) Field of peas fertilized the previous October through cover crop of rye. Pea crop was outstanding in uniformity and yield.

Right: Check plot in lower left corner contrasted with field at right fertilized through cover crop application.

point of uniform application. Ammoniation may be practiced if ammonia liquor is added to the fertilizer just before leaving the fertilizer plant. Such fertilizer must be spread without delay to prevent its "setting up" to make actual spreading difficult.

Unknown Factors

FROM experience to date, we can expect fertilization of cover crop to do a good job under certain circumstances. There are still some conditions under which its performance has not been measured and so is an unknown quantity. The best conditions for satisfactory performance may be enumerated as follows:

From the work to date, it would seem best to apply the fertilizer to the cover crop just as soon as the cover crop is established. In this manner the greatest stimulation is obtained to the cover crop with highest dry matter production. However, it can be applied at a much later date with good results.

The climate during the winter months in southern New Jersey is not too severe. There are many periods even during midwinter when cover crop can make some growth. What is definitely an advantage is a relatively long period in the fall when appreciable growth takes place. It is not known how satisfactory cover crop fertilization will be under more severe weather conditions.

The soil and its phosphorus-fixing capacity have some bearing on the efficiency of fertilizer used. For the vegetable crop a pH of 6.0-6.5 has been maintained with adequate continuous liming. Also considerable fertilizer with high phosphorus content has been used in the past. Under such circumstances, phosphorus fixation is relatively unimportant and the best yields have been obtained normally by plowing under fertilizers. Plowing under of fertilizers is not satisfactory where small amounts of fertilizer are used nor where the soil is quite acid. However, best yields are obtained when the soil is limed adequately and sufficient fertilizer is used and so distributed as to insure high availability of plant food under a wide range of conditions. It is in this capacity that fertilizer applied to the cover crop can be expected to give maximum performance. Conversely, under acid conditions and with small amounts of fertilizer, there is less chance for it to succeed.

Cover crop fertilization has been used at Seabrook on soils of different textures varying from sandy loams to silt loam with excellent results. In fact, results from the lighter soils have been especially gratifying and it appears to be one way of insuring a fairly constant supply of nutrients for crops on such soils. No experiments have been conducted on sands with this method of fertilization, but it is probably worthy of experimentation.

The amount of nutrients released for the succeeding crop is dependent to a degree upon the time of plowing under the cover crop. As a rule, the cover crop has been plowed rather early, usually by April 20, when the growth was about a foot high. If allowed to get "woody," there is some indication that release of nutrients from such cover crops may be too slow for the succeeding crop.

Summary

The application of fertilizer on the cover crop for the purpose of fertilizing the succeeding cash crop has been proven satisfactory experimentally under South Jersey conditions. Already in the commercial stage, cover crop fertilization offers several advantages over conventional fertilizer practices. Its advantage lies in the fact that such fertilization increases yields of cover crops, aids in supplying nutrients at a more constant rate for the succeeding crop, the fertilizer can be applied during slack periods and cover fertilization lends itself readily to bulk fertilizer distribution. The use of bulk fertilizer presents a substantial savings to farmers because of the elimination of bags and bagging, conditioner, expensive storage and rehandling.

From experience to date, the practice of cover crop fertilization will succeed best when the soil has been adequately limed, when a liberal amount of fertilizer is used and when the cover crop is plowed before becoming too woody. The application of fertilizer can take place during a relatively long period in the fall, or in early or late winter depending to a certain extent upon weather conditions. Application on the cover crop as soon as it is established tends to give best yields of cover crop. The practice can be used on a wide range of soil textures with equal success. Because of the possibilities in cover crop fertilization, it should be given a trial with different crops and in different areas. Judging from its past performances, it should find a place in many areas where it will do a better and cheaper job of applying fertilizers than is now possible with present methods.★★

Advantages of cover crop fertilization include increased yield of cover crop, nutrients supplied at more constant rate, convenience of applying at slack times and the economy of using bulk fertilizer

A.C.S. Presents Papers on . . .

FERTILIZER

Subjects cover minor elements, studies of controlled availability of nitrogen, sources of calcium in plant growth and production and supply outlook for 1948

Editor's note: Last month's issue of Agricultural Chemicals reported a number of papers in the insecticide and fungicide field, presented at the American Chemical Society convention in New York, September 15 to 19. In addition, a number of papers on fertilizer subjects were given at the meeting. Abstracts of some of these are presented in this issue.

JAMES A. Naftel, Pacific Coast Borax Co., presented a paper on boron research in agriculture. Since the recognition of its fertilizer value some 10 years ago, numerous problems have attended the introduction of boron into the field. A number of research projects are now under way, Mr. Naftel said, but because of the complexity of the problems related to the function and use of boron, many questions remain unanswered. Requiring further study are problems of soil-plant relationships; rate and frequency of application, leaching and fixation of boron in the soil, availability of boron as affected by time of application, interaction of other fertilizer elements including other minor elements, influence of other soil properties, and method of boron application.

Mr. Naftel also pointed out some of the problems confronting the fertilizer industry as including: amount of concentration to be mixed in the fertilizer, the grades or special fertilizers to contain boron additions; how boron content shall be reported; and an official method of chemical analysis for boron in fertilizers.

A paper prepared by K. G. Clark, J. Y. Yee, K. S. Love and F. O. Lundstrom, Division of Soils, Fertilizers and Irrigation, Bureau of Plant Industry, U. S. D. A., discussed "Uraform High-Analysis Synthetic Nitrogen Fertilizer of Low Solubility and Controlled Availability." ("Uraform" is a class of materials formed by the reaction of urea and formaldehyde) Such materials are relatively insoluble in comparison to the usual sources of chemical nitrogen for fertilizer. They contain 36 to 38 per cent nitrogen. Nitrification studies have shown that products with urea-formaldehyde ratios in the range 1.20 to 1.40 nitrify slowly at first, but once initiated, the nitrification process continues over a longer period of time and is more in accordance with crop requirements than is the case with soluble chemical nitrogen materials and many of the natural organics. The former are consequently less subject to nitrogen loss by leaching.

Experiments under greenhouse conditions indicate definite possibilities for the development of synthetic nitrogen fertilizers of low solubility and controlled availability. Initial experiments also indicate that such materials may be produced by simple, continuous, and relatively inexpensive methods of manufacture.

A symposium on calcium in agriculture was held under the chairmanship of Dr. Jackson B. Hester, soil technologist, Campbell Soup Co., Riverton, N. J. Dr. A. L. Mehring of the U. S. D. A., discussed the subject in his paper. He pointed out that calcium is present in nearly all mixed fertilizers, and that on the average, more calcium is supplied to the soil than any other nutrient element. Mixed fertilizers of the present time supply about the same quantity of CaO per ton as they did 10 or 50 years ago, he said. The relationship of CaO content to the P_2O_5 content

(*Turn to Page 65*)

Agricultural Chemical CONTROL OFFICIALS MEET

OCTOBER 19 to 25 marked a concentrated week of activity in the agricultural chemical field at the Shoreham hotel, Washington, D. C., when in quick succesion four groups met for annual conventions. These were the Asociation of Economic Poisons Control Officials; the Association of Official Agricultural Chemists: the Association of American Fertilizer Control Officials, and the Association of American Feed Control Officials.

Association of Economic Poisons Control Officials

DR. J. L. St. John, Chairman of the Division of Chemistry and State Chemist, Pullman, Washington, was re-elected president of the Association of Economic Poisons Control Officials October 19, in the group's first annual meeting held at the Shoreham Hotel. Officials from 28 states were present at the all-day session. In addition to Dr. St. John's re-election, H. J. Hoffman, Chief Chemist, Minnesota State Dept. of Agriculture, Dairy and Food, St. Paul, was named vice-president. The new secretary-treasurer is A. B. Heagy, Chemist, Maryland Inspection Service, College Park, Md. Mr. Heagy succeeds Allen B. Lemmon, Chief of the Bureau of Chemistry, California Dept. of Agriculture, who was named to the executive committee.

Other members of the executive committe named were Dr. W. G. Reed, Chief, Insecticide Division, U. S. D. A.; Dr. J. F. Fudge, State Chemist, Texas Agricultural Experiment Station; and Dr. H. J. Fisher, Connecticut Agricultural Experiment Station, New Haven. Mr. Lemmon and Dr. Reed will serve two year terms, and the others terms of one year. The three officers are also ex-officio members of the executive committee. Last year's executive committee included, in addition to Dr. Fudge and Dr. Fisher, Dr. H. A. Lepper, U. S. D. A., Washington, D. C.; L. E. Bopst, College Park, Md.; D. S. Coltrane, Raleigh, N. C.; J. D. Patterson, Salem, Oregon, and Dr. Hoffman, now vice-president.

The meeting was held jointly with industry representatives, the latter group comprising about half of the 72 persons registered, and the remainder made up of state poisons control officials and members of the U. S. Dept. of Agriculture.

The program opened with an address of welcome by Dr. P. N. Annand, Chief, Bureau of Entomology and Plant Quarantine, U. S. D. A. Dr. Annand characterized the oc-

casion as an outstanding day in the history of U. S. economic poisons control. He predicted that in years to come, the advent of the first annual meting would be reviewed as a significant occasion. The B. E. P. Q. chief pointed out how increasing complexity in the insecticide and fungicide field make it necesary for everyone concerned with pest control, to follow carefully the enforcement of the new Federal Insecticide Act. He pointed out the serious crop losses caused by improper use of chemical materials during the past season, and stated that the picture will grow even more complex. He said that adequate regulation and proper research are necessary for the maximum benefit to and protection of the farmer. Adequate research is difficult to carry out fast enough, he said, and there is always the temptation to put on the market certain new products before they have had time for proper evaluation.

Allen B. Lemmon presented the secretary's first annual report. He related the history of the organization, told how it came into being, and pointed out some of its objectives. He commended a number of persons who had assisted in bringing the association into being, and who had helped in arranging the meeting.

Dr. J. L. St. John, president, offered a comprehensive view of the objects to be achieved by the group. He outlined a number of the problems facing the industry, including labeling, Federal and State regulations, standard definitions for products, nomenclature, and uniform registration applications. Such problems should be given cooperative consideration, he declared. That there would be no overlapping by the new group of work done by the older Association of Official Agricultural Chemists was emphasized by the Control Officials' president. The new organization is designed to deal primarily with different types of problems, he said, but predicted that the work of the two associations at times may be cooperative.

Dr. W. G. Reed, chief, Insecticide Division, U. S. Department of Agriculture, then presented a paper discussing the new Federal Act, and regulations for its enforcement. He discussed briefly the former Insecticide Act of 1910, stating that it had been a good law in its day, but that the introduction of complex organic insecticides and the development of new rodenticides, weed killers and fungicides with their attendant problems had made the old law inadequate for its purpose. He explained some of the registration provisions of the new law, describing the procedure of registering under protest. This latter provision was included to prevent the Secretary of Agriculture from holding "life and death" power over every firm marketing economic poisons in interstate commerce. It was contended also that no agency has all the accumulated knowledge necessary to pass on the merits of all products being developed, and that the manufacturer must therefore assume that responsibility. Dr. Reed also discussed labeling, including the problems connected with ingredient statements.

Industry Speakers Appear

LEA S. Hitchner, Executive Secretary of the A. I. F. Association, New York, discussed the responsibilities faced mutually by the law enforcement officials and the industry. He stated that the primary responsibilities of the trade are toward the public, the farmer, the distributor, and the industry itself. He emphasized that it was impossible for 48 state administrators to discuss with individual companies the problems which are sure to arise. "We are very hopeful that through a cooperative program . . . a full and frank interchange of views will be possible,"

Below, left: group of pioneer economic poisons control officials honored at luncheon, with Allen B. Lemmon (left) who introduced them. Remainder of group are: (L to R), J. J. T. Graham, Dr. C. C. McDonnell, Dr. E. L. Griffin, and Dr. Alvin J. Cox.

Below, right: New officers of A.E.P.C.O. Front row, (L to R) A. B. Heagy, secretary-treasurer; Dr. J. L. St. John, president; and H. J. Hoffman, vice-president. In the back row are members of the executive committee: Dr. W. G. Reed, Dr. J. F. Fudge, Allen B. Lemmon, and Dr. H. J. Fisher.

—*Photo Courtesy American Plant Food Council*

Clifton A. Woodrum, (left) president, American Plant Food Council, Washington, D. C., speaks at banquet. Center is Dr. D. S. Coltrane, retiring president, A.A.F.C.O.; and at the right is Henry R. Walls, secretary-treasurer.

he said, and added that the result can be more effective administration, better industry compliance, and better protection and benefit to the user.

Following Mr. Hitchner's talk, the group heard H. W. Hamilton, secretary of the National Association of Insecticide and Disinfectant Manufacturers. Mr. Hamilton pointed out that although the dollar volume of the household and industrial insecticide field is not as great as in the agricultural field, yet more packages and more persons are involved in the business. "Laws are made for the people . . . all the people," he said. "The N. A. I. D. M. viewpoint is always tempered by the fact that we sell the millions . . . the masses." In discussing the Insecticide Act of 1910, Mr. Hamilton reminded that when it was passed only eleven states had legislation covering production and marketing of insecticides, and that these laws were simple. By 1918, twenty-one states had such legislation, and by 1925, thirty states were included. By 1946, however, the list had grown to thirty-seven. With this background, he related the story of the development of the recent Act, and predicted that by 1950 it is likely that all the states will have economic poisons laws.

The meeting then turned to an open discussion upon a number of topics. S. A. Rohwer, Bureau of Entomology and Plant Quarantine, U. S. D. A. remarked that the words "Economic Poisons" in the new association's name are not entirely satisfactory since many persons do not know their meaning. In their place, Mr. Rohwer suggested the name "Pesticides" which is used for similar designations in Canada. Dr. A. J. Cox, retired chief of the California State Bureau of Chemistry commented that "poison is poison," and that it seems a bit incongruous to poison an insect with non-poisonous material. L. S. Hitchner then stated that changing the name of the Agricultural Insecticide and Fungicide Association to "Agricultural Pesticide Association" has been given serious consideration as a short-cut. Mr. Hamilton carried the thought further by stating that the word "poison" contains an element of fear to many, and that the suggested term would avoid this psychological hazard. Dr. E. L. Griffin of the U. S. D. A. commented that "economic poisons" is not "too bad a term."

The question arose regarding active and inert ingredients. Mr. Rohwer was asked for a definition of the two, and stated that he did not like either word, because there are certain conditions under which neither term is entirely accurate. "What is needed," he said, "Is definite information regarding the active ingredients on labels." He urged the industry to capitalize on significant names, and warned against the use of a confusing array of extra names which have nothing to do with the real formula.

During the luncheon session, four pioneers of the economic poisons law enforcement field were honored by the group. These included Dr. C. C. McDonnell, formerly of the U. S. D. A.; Drs. H. L. Griffin and J. J. T. Graham of the U. S. D. A., and Dr. Alvin J. Cox. They were introduced to the group by Allen B. Lemmon, and each of the four spoke briefly in acknowledgement.

The afternoon session consisted of an organizational meeting, and a talk by Dr. Henry A. Lepper, Secretary of the Association of Official Agricultural Chemists, who discussed the manner in which his association and the new group may cooperate. Reports from various sections of the U. S. were heard next. These were presented by J. D. Patterson, Chief Chemist, Oregon Department of Agriculture; Dr. H. J. Hoffman; Dr. H. J. Fisher, chemist in charge of Connecticut Agricultural Experiment Station; and Dr. J. F. Fudge.

The Uniform State Insecticide Bill was discussed by Dr. E. W. Constable, State Chemist, North Carolina State Department of Agriculture; and Dr. W. G. Reed spoke on Federal-State cooperation. Dr. R. C. Roark of the U. S. Department of Agriculture presented the final paper of the day in discussing the new organic insecticides.

A. O.A.C. Annual Meeting

FOLLOWING the meeting of the A. E. P. C. O., the sixty-first annual convention of the Association of Official Agricultural Chemists, Inc. opened October 20 at the Shoreham. The group named the following officers at the end of its three day session: president, Dr. G. H. Marsh, director, State Chemistry Division, Montgomery, Alabama; vice president, L. S. Walker, state chemist, Burlington, Vermont; secretary-treasurer, Henry A. Lepper, Food and Drug Administration, Washington, D. C. Dr. Marsh succeeds J. O. Clarke of the Food and Drug Adminstration, Chicago, who now becomes an ex-officio member of the executive com-

mittee. Other members of the executive committee include W. A. Queen, chief, division of State Cooperation with the Food & Drug Adm.; H. A. Halvorson, State Chemist, St. Paul, Minn.; and W. B. White, chief, Food Division, Food & Drug Adm., Washington, D. C. Dr. W. W. Skinner, retired chief of Bureau of Agriculture & Industrial Chemistry, U. S. D. A. is secretary-treasurer emeritus.

A section of the meeting devoted to papers on fertilizers, was presided over by F. W. Quackenbush of Purdue University, Lafayette, Ind. Discussions covered sampling, phosphoric acid content, moisture, nitrogen and potash. A number of contributed papers on fertilizer were presented. These included one on the "Rapid Determination of Total Nitrogen in Ammonium Nitrate Fertilizer," by Dr. Ralph D. Miller; "Composition and Fertilizer Value of Phosphate Rock-magnesium Silicate Glass," by Drs. W. L. Hill, W. H. Armiger and K. D. Jacob of the U. S. Department of Agriculture; and "The Effect of Saturation of the Acid Alcohol with K_2PtCl_6 in the Determination of Potash in Fertilizers." by Drs. E. D. Schall and O. W. Ford; of Purdue University.

Drs. John O. Hardesty, Colin W. Whittaker, and W. H. Ross of the U. S. D. A. contributed a paper on "The Air-flow Method for the Determination of Moisture in Fertilizers," and Drs. L. J. Hardin, W. H. MacIntire and H. S. Johnson, Jr. of Tennessee contributed one describing a procedure for the determination of available magnesia engendered in mixtures of superphosphate with olivene, serpentine, magnesite, and their calcines. Drs. Hardin and MacIntire also told of a procedure for the determination of the phosphorus content of hexaethyl tetraphosphate and of certain other organic phosphates.

A report on investigations of DDT in food was presented in a paper by R. H. Carter, Bureau of Entomology & Plant Quarantine, U. S. D. A., Beltsville, Md., and in another session discussion was held on rodenticides and DDT. These were presented by J. W. Elmore, Sacramento, Calif., and E. E. Fleck, of the B. E. P. Q., respectively.

Other sections of the meeting included numerous papers on foods and beverages, cereals and baking powders, procesed vegetable products, vitamins, and drugs. A business session occupied all of Wednesday afternoon, the last day of the meeting.

Fertilizer Control Officials

IN a one-day session, October 21, the Association of American Fertilizer Control Officials held its first annual convention at the Shoreham. New officers elected by unanimous vote were Allen B. Lemmon, chief, California Bureau of Chemistry, president; B. D. Cloaninger, Clemson S. C., vice-president; and secretary-treasurer, Henry R. Walls, College Park, Md. Mr. Lemmon succeeds Dr. D. S. Coltrane, Raleigh, N. Carolina. The executive committe includes the three officers and Dr. F. W. Quackenbush, Lafayette, Ind.; Dr. L. S. Walker, Burlington, Vt.; Dr. J. F. Fudge, College Station, Texas; and Dr. W. B. Griem, State Chemist, Dept. of Agriculture, Madison, Wisc.

The opening session included an address of welcome by president D. S. Coltrane, and a talk by J. R. Taylor, agronomist, of the American Plant Food Council, Washington, regarding the mutual responsibilities of the two groups. Maurice H. Lockwood, president of the National Fertilizer Association, Washington, then told the control officials of changing patterns in the use of fertilizer in the U. S., pointing out how new techniques and new areas of use are being developed throughout the country.

Dr. W. A. Minor, Assistant to the Secretary of Agriculture, Washington, reviewed the fertilizer outlook for 1947-48, stating that the demand for these materials is likely to remain heavy for some time to come.

A symposium of control problems associated with new materials and methods of distributing fertilizer to the farm was presented by three speakers. Allen B. Lemmon discussed liquid fertilizers, including liquid phosphoric acid; R. A. Maddox, Jackson, Mississippi talked on "Anhydrous Ammonia and Nitrogen Solutions"; and Stacey Randle, New Brunswick, N. J., on "Bulk Distribution."

The evening program included a number of papers on fertilizer manufacturing and control subjects, Dr. F. E. Bear, New Brunswick, N. J., discussed "The Growing Importance and Need for Control"; Dr. E. W. Constable, Raleigh, N. C. spoke on "Labeling for Secondary Plant Foods"; and J. J. Taylor, Tal-

(*Continued on Page 69*)

Allen B. Lemmon, (right) chief of the Bureau of Chemistry of the Department of Agriculture, Sacramento, California, newly-elected president of the Association of American Fertilizer Control Officials, confers with B. D. Cloaninger, Department of Fertilizer Inspection and Analysis, Clemson College, Clemson, S. C., newly-elected vice-president of the group.

—Photo Courtesy American Plant Food Council

NOW—a ONE-TREATMENT PROGRAM
for Sarcoptic Mange and Hog Lice

PENCO BENZENE HEXACHLORIDE

This hog shows effects of ravages of the sarcoptic mange mite, a pest which has yielded completely to Benzene Hexachloride in one treatment.
Hogs being sprayed with Benzene Hexachloride for control of sarcoptic mange mites. Same treatment also controls hog lice and their eggs.

PENN SALT
AGRICULTURAL CHEMICALS

Photos courtesy Nebraska University Agricultural Extension Service

Here's news to please any hog-raiser: recent tests at the University of Nebraska have uncovered a new, simple, single treatment for control of sarcoptic mange mites on hogs . . . and also for hog lice.

Now, instead of three to five treatments at ten-day to two-week intervals, the hog raiser can check both mange mites and lice with but a single spraying of .25% of gamma isomer of Benzene Hexachloride (20 pounds of wettable dust of Benzene Hexachloride containing 10% gamma isomer in 100 gallons water). If hogs are thoroughly covered, including inside the ears, the treatment should be highly effective against both mange mites and lice.

PENCO W-12 Benzene Hexachloride, 12% gamma isomer—A micron-sized, wettable powder especially compounded for spray application. Ideal for sarcoptic mange mite and hog louse control. Thoroughly tested by State and Federal investigators, and by our own Whitemarsh Research Laboratories. Conforms to Pennsalt's rigid standards of quality and uniformity.

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Comments....

By Dr. Alvin J. Cox

This column by Dr. Cox appears as a regular feature of AGRICULTURAL CHEMICALS. Dr. Cox formerly was successively Physical Chemist, Chief Chemist, Assistant Director, and Director of the Bureau of Science, Government of the Philippines. He was appointed Chief, Bureau of Chemistry, California State Dept. Agriculture in 1932, retiring in 1945.

LAST month we discussed in this column features of the American business system which has made possible rapid strides in scientific research in the agricultural chemicals field as well as in numerous other areas. Included in the discussion were such factors as production, sales, competition, and the responsibilities of the manufacturer toward the consumer. The general theme is carried a step further this month, in pointing out the part played by law enforcement organizations in protecting both maufacturers and the consumer. To appreciate the full significance of this role, it is appropriate to view conditions as they were a few years ago.

Until the latter half of the eighteenth century, there had been but small advancement in the science of agriculture. Man's knowledge of plants had been acquired largely through trial and error, and new facts were gained almost by accident. However, gradually the processes of plant and animal growth were learned, and along with this knowledge, certain methods of controlling insect pests and plant diseases were discovered. More and more, agriculture came to depend upon chemical preparations.

Only a relatively few persons in those early days had any scientific education, so it was not difficult for unprincipled persons to take advantage of the prevailing ignorance and foist onto farmers all kinds of worthless or harmful concoctions. Such a condition made it difficult, if not impossible for legitimate and conscientious manufacturers to establish a sound clientele among growers who had often been cheated previously.

The need for practical and effective laws to regulate such products, and to prevent misleading and downright false claims became increasingly evident. The legitimate manufacturers welcomed the passage of the first of such laws, and since that time have come to depend upon their enforcement for protection from unethical practices in the trade. Each product must be sold on its own merit . . . each must be effective without being injurious to the host. The contents of each package must be as represented on the label . . . the material must live up to the claims stated for it on the package. All of this builds up a considerable list of qualifications for those who put controlling laws into practice, and those who seek out the violator.

Enforcement of these laws is not easy, and if adequate administration is to be attained, enforcement agents must be chosen upon merit alone, free from political interference. They must be tactful as well as tenacious. They must have the ability to be both polite and firm, and to have consideration for others. When such characteristics are lacking, an enforcement agent can largely defeat his own purpose by aggravating people and rendering them entirely uncooperative. It has been possible at times actually to trace the journeys of some agents by the enemies they have made en route. Such conflicts can be avoided by exercise of a straight-forward attitude, a willingness to talk things over, and the ability to present an unbiased viewpoint.

An administrator should be both idealistic and practical. He should know the terminology of the industries, so that he may "talk their language" and understand their problems. He should keep constantly in mind that the industrialists and the consumers are mutually dependent upon each other and that their greatest success depends upon their cooperation with or without his intervention. He should maintain a well known distinctive purpose of advancement and keep in mind that there are different routes by which progress can be made. He should strive constantly to find ways of improving the laws and administrative practices and have skill in developing means for bringing about such improvement.

Stolidity is frequently interpreted as unfriendliness. All suggestions honestly made toward improvement of the law and its administration should be considered. The agent should be able to recognize and compromise small practical differences. He should always remember that all registrants have the same rights under the law and that a careless remark about one's competitor may make lifelong enemies.

Without sacrificing any principle, an administrator should be discriminating, reasonable, and avoid

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SCIENTIFIC PEST CONTROL

being a stickler with regard to unintentional, unimportant irregularities which can be corrected in time without unfairness to anyone. Fanatical, arbitrary or flippant law enforcement is the worst handicap to be encountered, for it makes unnecessary trouble. An administrator is not the law, but an instrument of the law. Greater and more rapid progress is made if hobbies are avoided and if all, rather than only part of the facts are considered. It is seldom that one has all the facts and frequently by withholding judgment an injustice may be avoided. It pays big dividends for an enforcement officer patiently to instruct those under his jurisdiction and in return his own viewpoint may be broadened. The officer should realize enforcement of a law is not an end in itself, but that the goal lies in the achievement of honest practices in business. He must have the energy and willingness to explain a point, even though he may need to repeat the explanation many times. Courtesy and respect shown an administrator may often be due to his office rather than to his own personality. It is his opportunity to deserve such courtesies on his own. When he understands his public service, he can develop within himself the poise and polish which lead to success.

Unfortunately, there is often restraint in conversations between agricultural chemical law enforcement officials and manufacturers. They do not talk about what they think. There is a large place in industry and public relationship for the truth. Holding open discussions when several people are concerned is helpful. No one has a monopoly on ideas. A most effective way to straighten out problems is to call in all interested persons for a frank discussion. A sense of humor sometimes relieves a tense situation. Discussions should be with mutual respect and good will.

The formation of trade associations has aided in the administration of agricultural chemical laws, and officials can meet with such organizations for beneficial discussion of mutual problems. Such associations reflect a true cross-section of opinion, and can offer valuable advice. It is generally more constructive for officials to discuss problems with interested groups than with individuals. A common interest and better cooperation is developed by such meetings.

Sincerity and cordiality are always essential. Solemnity is sometimes misinterpreted. People hold resentment when they should by frank discusion get the dissatisfaction "off their chests" and proceed. A blunt "No" without explanation, when there is one to offer, creates difficult situations. It is almost impossible for one to foist his ideas on others without upsetting relations with those with whom he must live and work.

Face-saving (a form of self-respect) is important here as well as in the Orient. Many persons when given a chance to make good without embarrassment will be friendly, but otherwise might harbor resentment. A friendly approach is always best. An agricultural chemicals official should go a long way with a man before "cracking down." Patient discussion should always precede a citation, except in cases of flagrant violation, such as serious adulteration. It should be emphasized that the main job of agricultural chemicals law enforcement is *education*. Stern measures, seldom necesary, may be employed later if needed.★★

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N. E. Phytopaths to Meet

The second annual meeting of the Northeastern Division of the American Phytopathological Society will be held at Poughkeepsie, N. Y., November 25 and 26. Sessions will be held at the Hudson Valley Fruit Investigations Laboratory (New York State Agricultural Experiment Station). According to Dr. D. H. Palmiter, chairman of the local committee, the tentative plans call for the presentation of papers during the afternoon of the 25th, and a round-table discussion in the evening preceeding the business meeting. The second day's program will consist of further round-table discussions. Dr. W. T. Schroeder of the New York State Agri. Exper. Station at Geneva is secretary of the group, and Dr. S. E. A. McCallan of Boyce-Thompson Institute, Yonkers, N. Y., is president.

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Fertilizer Group to Chicago

A meeting of the National Joint Committee on Fertilizer Application is planned to be held at the Stevens Hotel, Chicago, December 15. The group will elect new officers, and will hear reports of committees and subcommittees in addition to a numbe of papers. Scheduled to appear on the program are Dr. F. H. Hull, Florida Experiment Station; Dr. F. E. Bear, New Jersey Station; Dr. G. B. Siems, Swift & Co., Chicago; and W. A. Roberts, former chairman of the Farm Equipment Institute. These are expected to discuss "Soil Fertility and Plant Breeding in Relation to Fertilizer Application." Other discussions will include "Radioactive Applications to Agriculture," by Vincent Sauchelli, Davison Chemical Corp.; Dr. W. L. Nelson, North Carolina Experiment Station; and a member of the Atomic Energy Commission, as yet unannounced at press time.

The subject of "Special Fertilizer Placement Problems" will be discussed by Dr. G. N. Hoffer, American Potash Institute; Dr. W. B. Andrews, Mississippi Experiment Station; Dr. N. J. Volk, Indiana Experiment Station; and Frank G. Steward, Shell Chemical Corp.

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Jap Fertilizers in Production

Although postwar fertilizer production rates in Japan are being steadly increased, the output is still below the level thought necessary for food production in the country, according to a survey by the Mitsubishi Economic Research Institute. Output of sulfate of ammonia was 64,000 tons one month, the peak to that time, but this was still 40 percent below prewar levels. This production was also lower than the planned figure because of coal and electric power shortages. A further shortage of sulfuric acid and technical difficulties encountered in the treatment of imported phosphate rock have contributed to the unfavorable production record, the report says.

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Foresters recently sprayed 387,000 acres of forest land in the Northwest with DDT to save an estimated $60,000,000 worth of timber from Douglas fir tussock moths. In the Northeast forests DDT is being used to control the gypsy moth.

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The Listening Post

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

Blue Mold in Wisconsin

TOBACCO blue mold or downy mildew, caused by the fungus *Peronospora tabacina,* has been reported in all major tobacco-growing areas in the United States and Canada since the first known occurrence in the Florida-Georgia shade-growing section in 1921. Up to 1947, Wisconsin tobacco crops had escaped the disease. In July, however, blue mold was found in a half-grown tobacco field in Dane County. A survey of the surrounding district located its presence on 27 farms. In many instances infection was so slight that it had not been noticed by the growers. The affected area lay chiefly on the northern border of the southern tobacco-growing section of the State and not in the more concentrated areas of tobacco culture. Infection apparently corresponded to a region in which precipitation occurred July 12-13, associated with very humid weather followed by relatively warm days and cool nights.

Symptoms found to be caused by the fungus but not typical of blue mold, observed during the survey on old plants in seedbeds long after transplanting had been completed, raise a question as to whether the disease may not have been present unrecognized in seedbeds in the State in previous years. Spread this year was evidently too late to cause appreciable seedbed damage, although the cool wet spring had delayed the transplanting season about three weeks later than normal.

In other parts of this country the disease is primarily a seedbed trouble. Readers of this column will remember the reports on its development in tobacco seedbeds in the eastern part of the country this spring. Occasionally, however, it has been reported as persisting and sometimes causing damage on tobacco set in the fields. Such field damage was reported in a North Carolina locality during July this year.

Texas Root Rot in La.

THE causal fungus of the so-called "Texas root rot," *Phymatotrichum omnivorum,* is a native inhabitant of alkaline soils in Mexico and much of the southwestern part of the United States, at not too high altitudes. Cotton, because it is the primary crop in most of the affected area, is the most important economic host, but the organism attacks literally hundreds of different kinds of plants, native and cultivated, so that balanced farming and soil conservation programs are hard to establish where it occurs. The only major group of plants not affected is that of the grains and grasses.

The disease gets its name from the fact that it has long been known and is very widespread in Texas. It occurs westward to extreme southern California. Fairly recently it was found to be present in the Virgin River Valley of southeastern Nevada and southwestern Utah. North of Texas the disease extends into southern Oklahoma, along the Red River which divides the two States, and into the counties of southwestern Arkansas forming the angle around the northeastern corner of Texas. The Red River here swings sharply southward into Louisiana.

Before this year the root rot had not been found in Louisiana. On August 12 infected cotton plants were discovered on a farm near Bossier City in Bossier Parish, on the east side of the Red River, in northwestern Louisiana. In a subsequent careful survey of major cotton sections of both Bossier Parish and of Caddo Parish on the west side of the river, one other infested field was found, near Dixie in Caddo Parish, about 18 miles north of Shreveport and about 30 miles south of the Arkansas line. Judging from the owners' statements, the root rot had affected cotton and other crops on their farms for many years. Damage was rather severe at each locality. Approximately 30 acres of land was affected on the farm near Bossier City, and about 4 acres on the plantation near Dixie. In addition to cotton, the disease was also found attacking sweetpotatoes at Dixie, and on carrots, beans, and turnips at Bossier City.

So far as known, the disease occurs only at these two localities. The owners of both farms were cautioned against the sale of infected truck crops to avoid possible spread to new localities, and were advised to retire the present infested acreage from cotton and other susceptible crops and to plant it to non-susceptible grain crops.

Anthracnose in Alabama

OF late years lupines have become important among legumes for soil improvement in Southeastern States. During early summer this year many fields of blue lupine in southern Alabama were severely damaged by anthracnose, caused by an undetermined species of *Colletotrichum.* All aerial portions of the plants were attacked but greatest damage was to plants. In many fields observed all of the plants were infected and up to 90 percent of the seed was destroyed in some. Within infected pods seeds were often infected, and most of them were shriveled. The disease was not observed until after May 1 so that

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lupines plowed under for soil-building purposes were not seriously damaged. The greatest threat from the disease appears to be to the seed crop, and since the major factor responsible for increasing use of lupines in southern Alabama is the ease with which the seed has been grown locally, any agency that reduces the seed crop is serious.

Golden Bell Twig Blight

A BLIGHT that has been noticed to affect occasional twigs of the golden bell, *Forsythia viridissima*, in North Carolina has been found to be caused by *Sclerotinia sclerotiorum*. This fungus is world-wide in distribution with a wide host range that includes numerous vegetable and field crops. It is not so common on woody plants, however, although it has been recorded as the cause of twig blights of citrus, figs, apricot, guayule, and camellia in various parts of the world, including Texas and California.

On golden bell the twig blight is noticed shortly after the plants have ceased flowering. Slightly sunken, discolored lesions girdle the twigs and the parts beyond the lesions are killed. Observations indicate that the fungus also causes a blossom blight of golden bell and that it invades the twigs by way of the flowers.

Insect Conditions In Late September & Early October

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

AS the crop season in many parts of the country rapidly draws to a close, reports on insect conditions have become relatively scarce except from the southern areas.

Infestations of the Mexican bean beetle have been on the decline since the middle of September throughout most of the range of this insect. By the middle of October infestations were still characterized as moderate to heavy in some southern districts, including South Carolina, Georgia, and Florida, lesser populations being reported from Virginia and Alabama. Early frosts about the first of October killed many beans in Virginia, North Carolina, and Tennessee, causing a rapid decline in the beetle populations.

Light to moderate infestations of the bean leaf beetle persisted during the first half of October in parts of Virginia and South Carolina. A few specimens of the bean leaf roller and banded cucumber beetle were still present on beans in Georgia toward the middle of the month, and the bean leaf looper occurred in small numbers in parts of Virginia. An unidentified species of lace bug was reported early in October causing damage to beans grown on dry land farms in the lower Rio Grande Valley of Texas.

Cabbage caterpillars continued to be abundant during the first half of October on cabbage and related crops in a number of areas, including parts of Maryland, Virginia, Alabama, Mississippi, Texas, and Arizona. They were reported as present in lighter numbers in North Carolina, South Carolina, Georgia, Florida, Tennessee, and Southern California. Moderate populations of the harlequin bug have also persisted into early October on cruciferous crops in Maryland, Virginia, Georgia, Florida, and Alabama. The fall armyworm was prevalent on cabbage in New Jersey and South Carolina toward the end of September and caused some damage to cole crops in Virginia the first half of October.

Typically severe infestations of the melonworm or pickleworm occurred the last half of September on late-season cucurbits in Georgia, North Carolina, South Carolina, Virginia, and Tennessee. Light populations were reported as persisting in South Carolina during the first half of October. Cucumber beetles occurred in destructive numbers on cucurbits and other vegetable crops in South Carolina, Florida, Tennessee, and Texas during the latter part of September.

A number of pests were reported attacking tomato in various areas, especially during the first half of October. These included: the tomato fruitworm, abundant in South Carolina and present in moderate numbers in California; light populations of hornworms in South Carolina, Mississippi, Texas, and California; a light but potentially dangerous infestation of the beet armyworm on tomato in Southern California; and a severe outbreak of the fall armyworm on that crop in the Bradenton district of Florida.

The beet leafhopper, vector of the curly top disease, has been moving from wild host plants to fields of sugar beets grown for seed in numbers sufficient to require insecticide applications in the Safford district of Arizona. Treatments consisted of a 10 percent DDT dust mixture, applied at the rate of 20 pounds per acre by ground equipment or 30 pounds per acre by airplane.

Few reports of aphid infestations on various crops have been received during this period. The green peach aphid persisted in small numbers during the last half of September on late tobacco suckers in the Nashville district of Tennessee, and heavy infestations persisted on a few remaining late plantings of tobacco in Gadsen County, Florida. By the middle of October this insect had reached a very low level of infestation except in one experimental planting of shade-grown tobacco in Florida. A heavy aphid infestation was observed in one celery seed bed in the Sanford district of Florida in early October.

A report on insects and mites

(*Turn to Page* 67)

THE RAT MARKET ...and your sales opportunity with ANTU

There is one rat for nearly every man, woman and child in the United States—an estimated 137,000,000 rats.

Rats cost this country an appalling sum every year—about $400,000,000—as estimated by one Government Service.

They compete with man for food, carry diseases transmissible to him, destroy or undermine his buildings, cut his electrical insulation, damage his property.

Rats are the most harmful, the most destructive, the most menacing to human health, of all the animal pests.

Today with such an effective and efficient rat-killer available as ANTU—a tremendous opportunity for sales is open to you.

THE CHEMICAL—ANTU (alpha-naphthyl-thiourea), discovered by government-sponsored research during the war, is a highly specific poison for the brown (Norway) rat—*the rat most commonly found in cities, towns, and on farms in the U. S.* It is relatively non-poisonous to other rodents and animals. So far as is known, it is non-toxic to man except in large amounts.

ITS PROPERTIES—ANTU is a finely granulated gray powder. It is insoluble in water but soluble in some organic solvents including ethyl alcohol, acetic acid, dioxan and pyridoxine. It is chemically stable, non-volatile, and non-irritating to the human skin.

EASE OF MIXING—ANTU mixes evenly with all kinds of food (or ground grain) and adheres well to dry or wet foods when dusted on them. It sticks to the feet and hair of rats when they run through it. It dusts well from insect dust sprayers and pump guns.

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Our descriptive bulletin gives latest information and recommendations on ANTU—how to use it—precautions to take. Send for it! Address *Agricultural Chemical Division*, J. T. Baker Chemical Co., 66 South Main Street, Phillipsburg, N. J.

THE COSTLY RAT!

RATS WASTE FEED

"About 50 pounds of grain or its equivalent are required to maintain one rat for 1 year, representing a minimum annual cost of 50 cents per rat for food actually consumed," says a Government Service. In addition, rats waste and contaminate about 100 pounds for every 50 pounds they eat.

RATS KILL CHICKS

Rats often kill apparently purely for the lust of killing. They have been known to kill several hundred baby chicks in a single night. Even full-grown hens and ducks, baby pigs, and lambs are killed. Large quantities of eggs are commonly destroyed.

RATS DAMAGE PROPERTY

Rat damage to property includes holes gnawed in many articles, including grain bags, leather, expensive upholstery, fabrics, furniture, doors, books, and even lead pipes—flooding, caused by burrowing in embankments—fires, caused by gnawing and short-circuiting electric wires—and undermining foundations of buildings.

RATS RUIN FOOD

To get at food rats usually gnaw through the container and ruin the whole package, although only a little is eaten. In warehouses, feed stores and mills, sacks of grain, stock feeds and flour are often spilled and fouled. In wholesale and retail grocery stores they gnaw into breakfast foods, crackers, bread, candies and almost all food products in cardboard, paper or wooden cartons.

RATS SPREAD DISEASE

Rats not only carry bacteria and other parasites on their feet and bodies, they transmit diseases of their own to man and domestic animals. Also, they acquire a number of human and livestock diseases, contributing to their spread. Diseases spread by rats include bubonic plague, typhus fever, spirochetal jaundice, rat-bite fever, food poisoning, tularemia, rabies, trichinosis.

HALF OF RATS ON FARMS

Government authorities estimate half of the rats in the United States are on farms . . . about 26 per cent are in non-farm country residences and in towns of less than ten thousand population . . . about 24 per cent are in cities of ten thousand or more. On the basis of observations by many people engaged in rat control, they roughly estimate there is one rat per person in the U. S.—about 137,000,000 rats.

LOSSES RUN INTO MILLIONS

A careful survey by one of the members of a Government Service last year resulted in the estimate of an annual loss of approximately $200,000,000 worth of cereals and cereal products as a result of foods eaten or damaged by rats. Total estimates of all damage range between $300,000,000 and $500,000,000 per year.

"If everyone understood the true status of the rat, how dangerous and how destructive a rodent it is, not a single rat would be allowed to exist in or near an abode or place of business."
—*U. S. A. Wildlife Circular 6.*

Baker's Chemicals

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Suppliers' Bulletins

3 Cyanamid Booklets

American Cyanamid Co., New York, has prepared three booklets covering weed control, defoliation, and fertilizer. The booklet on weed control describes the use of "Aero" Cyanamid in plant beds, and illustrates correct methods of application. The defoliation brochure goes into detail to describe methods and uses of "Aero" defoliant chemical dust, with numerous illustrations. A summary of how the product is used in various geographical regions is given in the booklet. "Aero-Phos," trade name of finely ground Florida phosphate rock, is described in the third booklet of the series. It presents numerous photographs and charts illustrating the value of phosphorus in pasture land as well as on cash crops. Given also are full instructions on use, and numerous suggestions for proper equipment for application. The three booklets may be obtained from the company's New York office, 30 Rockefeller Plaza.

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Chlordane Bulletins Offered

Julius Hyman & Co., Denver, Colo. have recently isued two technical bulletins on their chlordane product, "Octa-Klor.' These include Technical Supplement No. 2, concerning the preparation of chlordane emulsifiable concentrates. Technical supplement No. 205, chlordane for the direct control of truck crop and garden insects. These are available from the firm upon request.

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Dow Offers Ag. Features

Dow Chemical Co., Midland, Mich., in the fall edition of its magazine *Down to Earth* (Vol. 3, No. 2) presents a number of articles of interest to the trade. One is an article on livestock pest control by Ray L. Cuff, Kansas City, Mo., a picture feature of improvised truck spraying rigs; and a well-illustrated story on soil fumigation equipment reaching the market. Other subjects include an article on wood preservation by "Pentachlorophenol," and a report of controlling hog mange with benzene hexachloride. Further features include information on applying potato vine killer materials, and on controlling plum curculio on peach.

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25th Anniversary Booklet

Summers Fertilizer Company, Baltimore, Md., has recently issued a booklet, "Best on Earth," in connection with observance of the firm's 25th anniversary. The publication details the history of the company from its beginning in 1922 under the direction of Walter P. Summers, Willis R. Dresser and James E. Totman. The subsequent progress of the firm is related, including the acquisition of subsidiary plants. The 25th anniversary booklet lists as subsidiaries the following: Northern Chemical Industries, Inc.; Griffith & Boyd Co.; Maine Food Processors; Penobscot Warehousing Co; and Winterport Terminals, Inc.

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Sulfur Film Available

Texas Gulf Sulphur Co. recently sponsored the production of a new color film, "Sulphur," produced by the U. S. Bureau of Mines. The movie, first to be produced entirely under bureau supervision, uses animated diagrams to describe production operations and utilization of the mineral. The film is available for loan, and applications should be addressed to the Graphic Services Section, Bureau of Mines Experiment Station, 4800 Forbes St., Pittsburgh 13, Pa. The reel is in sound, and runs for 20 minutes .

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"Trex-80" Bulletin

Griffin Chemical Co., San Franciso, has announced a new solubilizer, "Trex 80," for use with Chlordane. The emulsifier is used in 50/50 concentrations which can be diluted with water of any hardness to produce colloidal solutions ranging from clear to opalescent and at any desired level of chlordane content, the makers say. These solutions are non-settling, assuring a uniform percentage of chlordane in the spray. Emulsions of chlordane can also be prepared by reducing the "Trex 80" content. Both solutions and emulsions have been used effectively in the field. Both eliminate phytotoxicity, odor and fire hazard of hydrocarbon solvents. A descriptive bulletin, F-102 is available from the company, 1000 16th St., San Francisco.

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Hudson Tank Heater

H. D. Hudson Mfg. Co., Chicago, has announced a new electrically-operated stock tank heater, trade marked "Lektrick-Heet." The device operates on the principle of a home electric heater, warming the water as it is used. Numerous tests have been made by the manufacturers during the past three years. The heater is adjustable for various degrees of temperature, but is set for 40° F. when leaving the factory.

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50 Year Booklet by Dow

Dow Chemical Company, Midland, Michigan, has issued a special golden anniversary booklet in commemoration of its 50th year of existence. The 20 page booklet presents a pictorial history of the company, bringing it up to date in post-war plans and future prospects for business.

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New Fertilizer Textbook

The 4th edition of "Commercial Fertilizers," a textbook of 522 pages, is announced by the Blakiston Company, publishers, Philadelphia. The book was prepared by Gilbert H. Collings, professor of soils at Clemson Agricultural College, Clemson, S. C. Included in its chapters is information covering the production of principal fertilizer elements, use of fertilizers, and an entirely new chapter on ammonium nitrate. Cost of the book is $4.50.

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When you consider the merchandising and marketing of a weed killer make sure you get the *right* 2,4-D for the job. And to make sure it's right, specify POWCO BRAND. The Powell laboratory is set up to solve your weed control problems. The Powell technical sales staff can answer your weed control questions. And these POWCO BRAND 2,4-D Formulations are RIGHT for packaging, RIGHT for weed control and RIGHT for your cost sheets!

SODIUM SALT

Powco Brand Sodium Salt of 2,4-D is actually a true sodium salt of the acid. It is an economical form of the weed killer for use in large scale application. It has a wetting agent added to make it go into solution easier and to wet the foliage better. It is adaptable to the preparation of agricultural herbicide dust.

ISOPROPYL ESTER

Powco Brand Isopropyl Ester of 2,4-D gives more satisfactory kill of hard-to-control weeds than other formulations. It is faster acting than other 2,4-D formulations. It is convenient to handle because it is diluted by volume and requires no weighing operation. It is a light, straw colored liquid which makes an attractive merchandising package. It forms a stable emulsion when diluted with water. It is oil soluble and can be diluted with a No. 2 fuel oil and used in air and ground equipment for atomization. Furthermore, ester dusts can be prepared from this Powco Brand material by atomizing or impregnating into suitable dust diluent.

ISOPROPANOLAMINE SALT OF 2,4-D

This Powco Brand liquid concentrate is completely water soluble—goes into solution instantly. Contains a wetting agent for more complete wetting of foliage. Will not clog spray equipment. Will not corrode rubber or metal. Dilutes on volume basis rather than weight and makes an attractive package because of its light straw color. High concentrations of the Isopropanolamine Salt can be prepared thereby saving on freight costs.

Write for complete information.

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Technical Briefs

Grasshopper Control

Benzene hexachloride, DDT, chlordane, and "Toxaphene" (chlorinated camphene) were tested as sprays and dusts in small field plots, in the greenhouse, and in the laboratory against grasshoppers. Although control by these insecticides represents a combination of stomach poison and contact poison, benzene hexachloride acts chiefly by contact, while DDT, "Toxaphene", and chlordane act chiefly as stomach poisons. On plants, chlordane had the longest residual effect, benzene hexachloride the shortest. Fresh deposits of benzene hexachloride on glass plates were most toxic and "Toxaphene" least toxic to nymphs. Benzene hexachloride was much more toxic to adults than the other insecticides tested. C. J. Weinman and G. C. Decker, *J. Econ. Entomol.* 40, 84-90 (1917).

•

DDT Spray Residues

Only peeling was effective in removing the DDT present on the skins of apples. Polishing, brushing, or washing with detergents, hydrochloric acid, or weak solutions of acetone, ethyl acetate, ethyl alcohol, or an emulsion of benzene, were not effective in reducing the DDT concentration below the tolerance limit. G. D. Manalo, R. Hutson, E. J. Miller, and E. J. Benne, *Food Packer* 27, No. 13, 64, 66, 68.

•

Japanese Beetle Control

In laboratory and field experiments, benzene hexachloride, DDT, and chlordane were effective toxicants for Japanese beetles. The various formulations, however, differed in their speed of knockdown, residual toxcity, and repellent value. At equal content of toxicant, emulsions of DDT and benzene hexachloride produced more rapid knockdown than water suspensions; the latter gave better residual kill and repellency. Benzene hexachloride in water suspension gave more rapid knockdown than DDT in similar formulation. As an emulsion, chlordane was less effective in knockdown or residual kill than DDT or benzene hexachloride. G. S. Langford and D. W. Squires, *J. Econ. Entomol.* 40, 269-70 (1947).

•

2,4-D Utility Increased

Application of the sodium salt of 2,4-D in an acid solution greatly increases plant killing power, according to Drs. C. L. Hammer, E. H. Lucus and H. M. Sell of Michigan Sate College, East Lansing, Mich. Experiments were made using the sodium salt of 2,4-D dissolved in distilled water and combined with solutions of 19 different acids. These preparations were applied to the primary leaves of bean plants about 10-days after the seeds had been planted. Effectiveness was determined by weighing the entire shoot growth above the primary leaves.

The best killing effect, the specialists claim, is obtained when the solution is strongly acid — (pH 2.0 to 3.0). The greatest killing power comes with a strong solution such as phosphoric acid, rather than with weaker ones.

Although not so effective as the acids or esters of 2,4-D, the sodium salt appears to have certain advantages to make it more practical than the others. It is less expensive, available in quantity, and dissolves in water. For these reasons, the experimenters found it best to develop a simple method for increasing its effectiveness to the point where it equals the commercial acid and ester preparations.

•

Rotenone for Grub Control

Rotenone is recommended by the U. S. Department of Agriculture for control of cattle grubs in a recent bulletin (#2486-47). It discusses the control of these pests as a measure to get more benefit from feed consumed by the animals. Grubs are appearing on the backs of animals in southern localities, and ranchers are urged to prepare to treat their livestock promptly and plan on repeating the treatment as often as necesary. Methods of application include dust, wash, spray, and dip procedures.

•

Root-Knot Control

Effective control of root-knot has been secured by fumigating tobacco fields with a 10 per cent ethylene dibromide mixture ("Dowfume W-10") and with a mixture of dichloropropane-dichloropropene. ("D-D" or "Dowfume-N") A minimum of 30 gallons per acre of the former and 15 gallons of the "D-D" mixture was required to insure significant root-knot control, according to the 1945-46 annual report of the Georgia Coastal Plain experiment station. In some instances, it says, 40 gallons and 20 gallons, respectively, gave even better control.

Tests indicated that the liquids should be applied to the soil at least 30 or 40 days before transplanting, 60 days being preferable. Applications made 3 to 5 months before transplanting were just as effective as those made 60 and 30 days in advance. However, treatments applied in early September did not give significant root-knot control in tobacco grown the following summer. Effect of these treatments on the burning aroma of cured tobacco leaf has not been determined conclusively.

Both of these soil fumigants were applied by pouring them into the soil at a controlled rate. Parallel streams were directed into the bottom of turnplow furrows twelve inches apart. The streams were poured in the furrow just in advance of the turnplow, so that the liquid was covered with soil immediately. This type of broadcast application was highly effective with each fumigant. The soil was not molested for at least 30 or 40 days after the treatment.

Applications were also made in the drill by pouring the liquids in a furrow under each tobacco row. This was done by first laying off the

(*Turn to Page* 67)

FOR ANIMAL SPRAYS AND DUSTS

that . . .

Kill the parasites that are here now

Kill the ones that come along later

Kill still others before they can start

USE THE COMBINATION THAT GIVES *FAST ACTION ALL THE TIME!*

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LETHANE B-71, for dusts, and LETHANE B-72, for sprays and dips, do an outstanding job of controlling animal parasites such as fleas and lice. They give fast knockdown . . . and their *ovicidal action* kills insects while still in the egg stage.

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INDUSTRY NEWS

2, 4-D Patent Suit Settled out of Court

THE long-standing litigation over four patents on 2,4-D between American Chemical Paint Co., Ambler, Pa., and Sherwin-Williams Co., Cleveland, has been settled out of court, according to an announcement made late in October by Sherwin-Williams Co. The settlement provides for making the 2,4-D inventions available to all other manufacturers on a nominal basis, and presents a schedule of royalties to be paid by licensees.

The Sherwin-Williams statement says that "litigation instituted by the Sherwin-Williams Company for determining the validity of U. S. Patent number 2,390,941 to (Franklin D.) Jones, covering the weed killers popularly known as 2,4-D, has been terminated by a settlement granting American Chemical Paint Company owner of the patent. The settlement also includes three other Jones patents covering similar weed killers, (numbers 2,394,916; 2,396,513 and 2,412,510). American Chemical Company has granted Sherwin Williams a paid up license on the four patents, and arrangements have been made to make the inventions available to all other manufacturers on a nominal basis.

"In this settlement the government and the public are given a free license to make and use, but not to sell, compositions covered by the patents involved in the litigation. In addition, the same free license is given to the government and the public under the three other Jones patents.

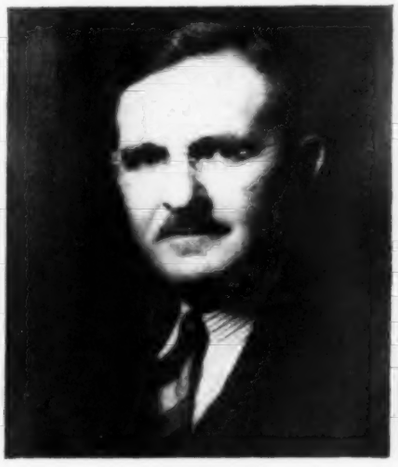
"American Chemical Co., Ambler Pa., will upon request, grant liceses to any responsible party desiring to manufacture and sell patented compositions. The royalty has been fixed at a maximum of 2% of the net selling price of patented compositions, a minimum annual royalty of $250 and a maximum total royalty for the lives of the patents of $10,000. No further royalty will be required. Distributors, retailers and any other resellers of the patented compositions require no license in order to sell compositions purchased from licensed manufacturers."

Legal action began on March 16, 1946 when S-W entered a suit in Federal Court, Wilmington, Del. asking that patents held by American Chemical Paint Co. be declared invalid, and that the latter be enjoined from bringing or threatening to bring suit against Sherwin-Williams. The Ambler firm then filed a counter suit in Federal Court, demanding of Sherwin Williams Co. triple damages and alleging infringement of its 2,4-D patents. Sherwin-Williams Co. was also accused of trademark infringement and acts of unfair competition.

The original 2,4-D patent was issued to John F. Lontz in 1943, but not for use as a weed killer material. Its purpose was to stimulate plant growth by use of concentrations of less than 0.1 percent. In later investigation by the Bureau of Plant Industry of the U, S. Department of Agriculture, it was discovered that in concentrations stronger than 0.1 percent, 2,4-D could act as herbicide. Later a patent was granted Franklin D. Jones, assignor to American Chemical Paint Co,

National Fertilizer Association Meets in Atlanta

Maurice H. Lockwood
N.F.A. President



Weller Noble
Chairman of the Board

The fall meeting of the National Fertilizer Association was scheduled to be held November 10, 11 and 12 at the Atlanta Biltmore Hotel, Atlanta, Ga. The advance program called for a meeting of the Board of Directors and various committees of the Association on the first day, with the general sesions beginning on November 11. Weller Noble, Pacific Guano Company, Berkeley, California, chairman of the Board, was to open the general session. His talk was to be followed by an address by Donald Comer, president, Avondale Mills, Birmingham, Alabama. A panel presented by the N.F.A. Plant Food Research committee was to close the formal activities of the day. The annual dinner at 7p. m. was scheduled to be accompanied by entertainment secured by a committee headed by J. Rucker McCarty.

November 12, final day of the

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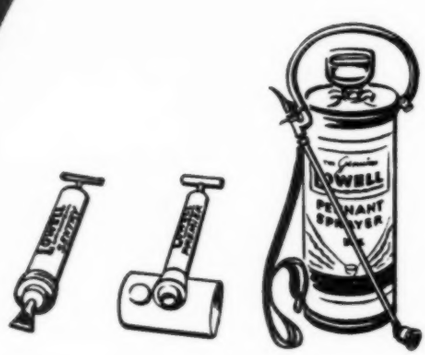

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meeting, was to feature the annual address of Maurice H. Lockwood, association president; and Omer S. Kelley, Agricultural Research Administration, U. S. Department of Agriculture, Colorado A & M College, Ft. Collins; Mr. Kelley's talk was to cover the unique methods of fertilization in irrigated areas of the Rocky Mountain area. Also scheduled on the advance program was L. R. Neel, editor of *Southern Agriculturist* Nashville, Tenn., and W. B. Andrews, Mississippi State College and Agricultural Experiment Station.

•

AIFA Presents Plan

The A. I. F. Association, in a telegram to President Truman last month, outlined a "produce more" program to complete the current national campaign for the conservation of food. The association subsequently called a meeting of industry leaders in New York to formulate a three-step program in line with Secretary Anderson's policy of "sustained abundance." This meeting, held at the Hotel Commodore, New York, was attended by representatives of insecticide, fungicide and other pest control manufacturers.

Bulletin

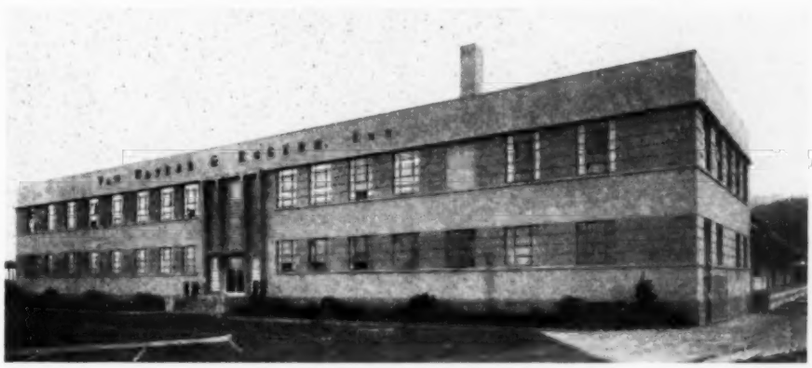
On November 4 the U.S.D.A. announced its backing of an "All Out" fight against all pests of stored grains. The aid and cooperation of trade organizations in the insecticide, fungicide and related fields is sought by the Department, as well as cooperation from farm organizations, colleges of agriculture, county agents, etc.

The Department urges greater use of pest control measures for livestock and crops, pointing out that the nutritional value of 10 percent of corn fed to animals is lost due to parasites. Huge savings of cotton, corn and small grains are possible by known means of insect control, the Department states, and additional losses may be prevented by control of weeds and plant diseases.

The first immediate step, according to L. S. Hitchner, A. I. F. Association secretary, is to protect present food stocks from damage in storage and shipment. Second is to extend the campaign of protecting livestock against insects and parasites which cut down production of meat, milk and eggs. Third is to begin next year using all the advances in crop protection developed during the war, but whose full application was held back because of shortages.

Numerous examples were cited by the association in its contention that extensive use of chemicals in crop and meat production will bring desired results. Mr. Hitchner cited control of the corn borer in the midwest; grasshopper invasions which destroyed 400 million dollars' worth of crops during the past decade; and the extra grain to be yielded when weeds are controlled. He also pointed out the ravages of rats and mice in stored grains, and the deprecations of the corn weevil which may destroy almost as much corn as is consumed by livestock. "Reducing these losses will make an estimated saving equivalent to 200 million bushels," he stated.

Van Walters & Rogers in New Western Office



Van Waters & Rogers, Inc. whose complete line of agricultural chemicals includes those produced by a number of well-known eastern manufacturers, is handling its west coast distribution from the above new office and warehouse in Portland, Oregon. The structure is 174 x 250 feet in size, and has 38,500 square feet of warehouse floorage. The company employs 70 persons.

Annual Meeting at Ithaca

The ninth annual New York State Insecticide and Fungicide Conference was scheduled to be held at Ithaca, N. Y. November 13 and 14. Place of the meeting was Bibbins Hall, G. L. F.., Terrace Hill. Although no announcement of speakers had been made at press time, it was indicated that the program would follow the pattern of previous meetings in which the staffs at experiment stations at Ithaca and Geneva review the work of the past year. Dr. L. M. Massey was in charge of the plant pathology portion of the meeting, and Dr. Charles E. Palm the entomological section.

•

New Fertilizer Division

Dr. K. D. Jacob has been named to head the new Division of Fertilizers and Agricultural Lime, a special section of the Bureau of Plant Industry, Soils and Agricultural Engineering of the U. S. Department of Agriculture. The Division of Soils, Fertilizers and Irrigation had previously been responsible for work in this field, but the need for increased attention to fertilizers and liming materials had become so pressing that a further division was made. With Dr. Jacob in the division, will be Dr. Charles E. Kellogg, soil scientist, who is chief of soil surveys.

•

Liquid Fertilizer Storage

The Delta Fertilizer Co., Helena, Arkansas, has completed arrangements for construction of a Horton Sphere with a capacity of 22 tank car loads of anhydrous ammonia — 82 per cent pure liquid nitrogen, to provide nitrogen fertilizer in liquid form to farmers of the eastern Arkansas Delta section. The sphere will be located outside the city limits. Ammonia will be supplied from the plant of the Lion Oil Co., El Dorado, Ark. Additional storage plants, each capable of holding one-car deliveries of fertilizer, will be located at eight other points in the state.

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St. Regis Paper Co. in New B.C. Building

St. Regis Paper Co. has recently announced completion of its new Multi-Wall paper bag plant at Vancouver, British Columbia, Canada. The $450,000 plant, shown above, has three times the capacity of its predecessor. Output from this plant will be earmarked for the Canadian west coast and export trade. With the new plant operating, total Canadian output by St. Regis is expected to reach 225,000,000 paper shipping bags annually. Two other St. Regis plants are located at Dryden, Ontario and Three Rivers, Quebec, respectively.

AAEE & APS Meet in Dec.

Final plans were being completed at press time for the annual meetings of the American Association of Economic Entomologists and the American Phytopathological Society, scheduled to convene in Chicago Dec. 26-30 and 27-30, respectively. The AAEE will meet at the Congress Hotel, and the Phytopath group will gather at the Stevens. The meeting dates correspond with those of the American Association for the Advancement of Science, also meeting in Chicago.

Continuing some of the features of last years meetings, both the AAEE and the APS plan to hold discussions of current products and problems. Representatives of the insecticide and fungicide industries have been invited to discuss new materials now on the market, those due for marketing in 1948, or products still in the experimental stage. Such presentations will be made by accredited technical representatives of various manufacturers of insecticidal and fungicidal materials, with full clearance from these manufacturers to speak.

The Fungicide Colloquium will be held at the Stevens on December 29, under the general chairmanship of Dr. Frank Howard, Rhode Island Experiment Station, Kingston, R. I. Subjects to be discussed are under two general heads: Report of field tests with new fungicidal sprays and dusts; and "fungicides and the Future." The former, under the chairmanship of Dr. J. D. Wilson of Wooster, Ohio, will report fungicide trials with potatoes, apples, stone fruit, tomatoes and cucurbits. The latter group, under the chairmanship of Dr. H. C. Young, Sr., Wooster, Ohio, will consider trends in the control of plant diseases and the responsibility of industry; naming of fungicides; indexing of fungicidal chemicals; the effect of the Insecticide-Fungicide Act of 1947 on industry, the pathologist, and the user; and activities of interest to the plant pathologist. The Insecticide group will carry out a similar program in its symposium, according to the early plans.

Meetings

Agricultural Chemicals wishes to publish the meeting date and place of any gathering concerned with manufacturing, distribution, application or discussion of chemicals for agricultural use. Information of such meetings is solicited.

National Association of Insecticide and Disinfectant Manufacturers, annual meeting, Lord Baltimore Hotel, Baltimore, Md., December 1, 2, 3.

North Central Weed Control Conference, Topeka, Kansas, December 10, 11, 12.

Western Colorado Horticultural Society, Fifth Annual Meeting, Mesa College, Grand Jct., Colo., January 9 & 10, 1948.

Eastern Branch, American Association of Economic Entomologists, Benjamin Franklin Hotel, Philadelphia, November 21 & 22.

Northeastern Division American Phytopathological Society, Poughkeepsie, N. Y., November 25 & 26.

American Association of Economic Entomologists (In conjunction with meeting of American Association for Advancement of Science,) December 26-31, Congress Hotel, Chicago, Ill.

Exposition of Chemical Industries, Grand Central Palace, New York, December 1-6.

Cotton States Branch, AAEE, Atlanta, Ga., February, 4, 5, 6.

•

White to Baird & McGuire

Baird & McGuire, Inc., Holbrook, Mass. announces the appointment of William H. White as Pacific Coast representative to cover the states of California, Oregon, Washington and Nevada. The company will carry stocks on the Coast for faster service to customers, it was announced. The new representative was formerly with Wilwite Associates, Oakland, California.

•

Eastern AAEE Group Meets

The Eastern Branch of the American Association of Economic Entomolgists was scheduled to hold its annual meeting at the Benjamin Franklin Hotel, Philadelphia, Pa., November 20 and 21. Entomologists from eastern Agricultural Experiment stations, the U. S. Department of Agriculture and representatives of various manufacturing firms were expected to be present.

More than 60 papers were to be presented at the meeting, and tentative plans were made for a round table discussion on the evening of Thursday, Nov. 20. Officers of the Eastern Branch are Dr. J. O. Pepper, State College, Pa., chairman; Dr. Byrley Driggers, New Brunswick, N. J., secretary; and Dr. C. M. Packard, U. S. Department of Agriculture, Washington, vice-chairman.

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More than 2,000,000 lbs. of 20% Toxaphene have been made available for field tests on 1947 crops. Preliminary results demonstrate the low-cost, commercial insect control possible with this new Hercules toxicant. Find out about Toxaphene *first* for '48!

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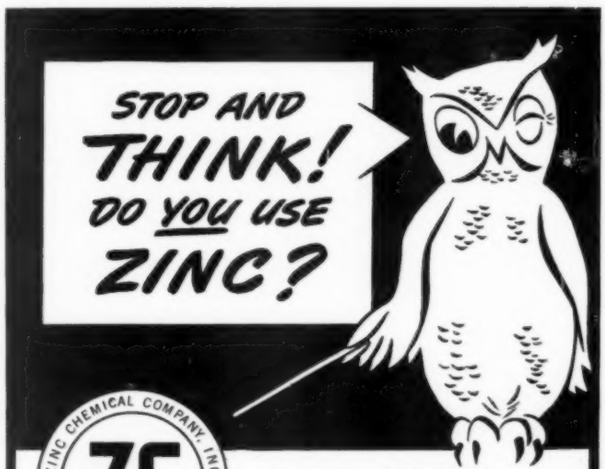

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Import Hearing Nov. 20

The production and Marketing Administration of the U. S. Department of Agriculture announced early this month that a hearing would be held in Washington on November 20, to discuss proposed regulations concerning imports under the provisions of section 10 of the new Federal Insecticide, Fungicide and Rodenticide Act. The hearing was scheduled to permit an airing of views on the subject before the final regulations were adopted.

•

Chemical Show Dec. 1-6

The 21st Exposition of Chemical Industries is scheduled to be held at Grand Central Palace, New York, December 1 to 6. More than 350 exhibitors will display hundreds of chemical products including many in the agricultural chemical field. The week-long exposition is expected to draw spectators from all parts of the United States and other countries.

•

Plans Fertilizer Plant

International Minerals & Chemical Corp. has announced plans for construction of a plant in Somerset, Ky., designed to produce from 12,000 to 15,000 tons of mixed fertilizer annually. Construction is expected to begin in the spring. The company operates some 31 plants in fifteen states.

•

Warns Pest Controllers

Charles F. Irish, president of Charles F. Irish Co., Cleveland arborists, and a past-president of the National Shade Tree Conference, in a letter to *Agricultural Chemicals* warns against unqualified operators going into the pest control fields of agriculture, stating that there are already too many poorly informed operators in the field. His letter states:

"I note with interest your editorial comment in the September issue—On pest control operators broadening their field and entering the agricultural pest control field. We already have too many poorly informed operators in the field and not enough qualified operators.

"It seems to me your comment would have been of more service to all operators if you had stressed the greater need of a fund of information regarding plants, soils and other factors not met with in the industrial pest control field. To create or foster the impression that the possession of a sprayer plus experience in the industrial field qualifies one to enter the agricultural field without training is wrong.

"In fairness both to those qualified operators in this field as well as the prospective operator, I suggest you point out the need of this information and knowledge as a prerequisite to entrance in this field."

•

To New Freeport Position

Freeport Sulphur Co., New York, has announced the election of Henry L. Pierson as secretary of the company. Mr. Pierson has been assistant secretary of Freeport since 1939.

You name it

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Stauffer offers a complete line of insecticides, fungicides, spraying oils, stock dips and soil conditioners, from plants and warehouse stocks located in every agricultural section of the country.

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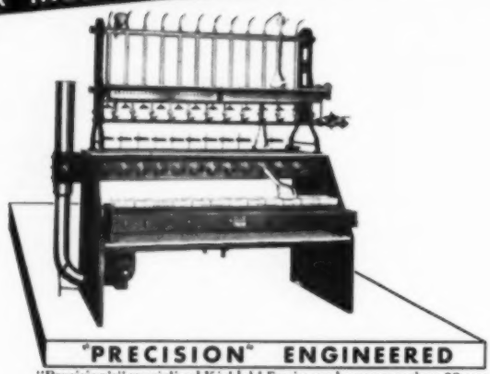
MEANS PERFORMANCE ENGINEERED TO YOUR INDIVIDUAL NEEDS AND BUDGET



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"Precision's" specialized Kjeldahl Engineers have more than 20 years of experience in designing and building individual Kjeldahl Installations. The careful considerations given to your individual needs is a prime factor in developing equipment which gives the utmost in efficiency, accuracy and trouble-free performances.

The many patented, exclusive "Precision" features give positive assurance of continued trouble-free performance with a minimum of attention and minimum operating costs.

Write for detailed Kjeldahl Bulletin 515-O

See Your Laboratory Supply Dealer

Precision Scientific Company

5737 WEST CORTLAND STREET CHICAGO 39, ILLINOIS, U.S.A.

Scientific Research and Production Control Equipment

for '48 it's Toxaphene*

[HERCULES CHLORINATED CAMPHENE]

During 1947, state entomologists, extension stations, and other agricultural authorities used over 2,000,000 lbs. of 20% Toxaphene to test its effectiveness against cotton insects and other pests. Find out about Toxaphene *first* for '48!

HERCULES POWDER COMPANY
INCORPORATED
970 Market Street, Wilmington 99, Delaware

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What's Your Problem?

Aphid Spray
•
Nicotine Base for Dust
•
Controlling Poultry Roundworm
(Ascaridia galli)
•
Delousing Poultry
•
Dip and Drench for Sheep, Goats
•
Control of Certain Cattle Lice
•
Greenhouse Fumigation
•

TOBACCO BY-PRODUCTS

Surely Has The *Answer*—In These Products Identified by the Renowned BLACK LEAF

Black Leaf

1. The FAMOUS BLACK LEAF 40 — for spraying or dusting to control small sucking insects, plant lice, and similar pests. Also used to control external parasites of cattle, sheep and poultry—and as a drench for sheep.

2. BLACK LEAF 155 — for spraying apples and pears to control codling moth, also for controlling grape berry moth.

3. BLACK LEAF DRY CONCENTRATE — used as a spray or dust — a dry powdered nicotine compound for easy mixing and handling.

4. BLACK LEAF 155 WITH DDT — for spraying apples and pears for the control of codling moth, leafhoppers, and similar pests.

5. BLACK LEAF 10 DUST BASE — meets the demand for a nicotine compound easily mixed with non-alkaline carriers to make a neutral dust.

6. BLACK LEAF CUNIC DRENCH — for sheep and goats. Formula recommended by U. S. Department of Agriculture.

7. BLACK LEAF POWDER AND PELLETS — for controlling the large roundworm (Ascaridia galli) in chickens.

8. MASH-NIC — for mixing with poultry feed to control large roundworm.

9. NICO-FUME LIQUID — for greenhouse spraying and fumigating — especially refined.

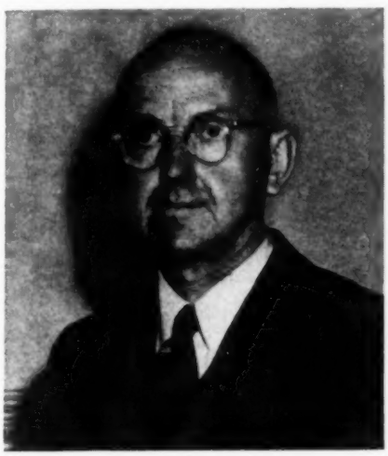
10. NICO-FUME PRESSURE-FUMIGATOR — spreads penetrating fumes under pressure — controls aphids and similar insects in greenhouses.

PROTECTION FOR FARMERS . . . . PROFITS FOR DEALERS

TOBACCO BY-PRODUCTS & CHEMICAL CORPORATION
LOUISVILLE 2 • • • KENTUCKY

Hockenyos New Pest Control President

GEORGE L. Hockenyos, Springfield, Illinois, was elected president of the National Pest Control Association in the group's 15th annual convention at the Bellevue-Strafford



GEORGE HOCKENYOS

Hotel, Philadelphia. The meeting ran from October 27 to 29th. The new president succeeds J. Harvey Sturgeon, Louisville, Kentucky. William O. Buettner, Brooklyn, N. Y. and R. C. Yeager, Cincinnati, Ohio, were re-elected secretary and treasurer, respectively.

The general theme of the meeting centered around looking ahead in the pest control business. The first day's session included talks by five men who discussed their ideas of the future of the pest control industry, each from his own geographical viewpoint. These were Lee C. Truman, Indianapolis; Mark Weintraub, Boston; Charles J. Menard, San Francisco; Herman L. Fellton, Atlanta; and Oliver Goldsmith, Waco, Texas. Dr. Alfred Weed, John Powell & Co., New York, spoke as a chemical supplier, and two entomologists, Prof. J. J. Davis, Purdue University, and Dr. George C. Decker, Illinois Natural History Survey, Urbana, Ill., commented on the industry's future. S. A. Rohwer represented the U.S.D.A.

"New Arms in Pest Control," were discussed on Tuesday. Speakers included J. D. Williams, Springfield, Ill., Mr. Hockenyos; Bartlett W. Eldredge, Waltham, Mass.; and Dr. John B. Schmitt, Rutgers University. Dr. Schmitt discussed "Pests Outside the Four Walls," looking to a possible expansion of pest control into out-of-doors procedures, such as control of agricultural pests. Other topics included water proofing, flame proofing and pigeon control.

Tuesday afternoon's speakers included Dr. Isreal Weinstein, commissioner of health, New York City; Robert C. Stanfill, Food and Drug Administration; Dr. R. M. Mehurin, U. S. Department of Agriculture; Dr. James C. Munch, Upper Darby, Pa.; and Dr. Robert J. Huebner, U. S. Public Health Service.

A business session occupied Wednesday morning, with president J. Harvey Sturgeon as chairman. In the afternoon Mr. Hockenyos, newly-elected president presided. Prof. H. Fringes, State College, Pennsylvania addressed the group on ultrasonics as a possibility in pest control. A number of mechanical application devices were demonstrated before the group in connection with a discussion of equipment problems under the chairmanship of Dr. A. L. Brody, New York. Speakers included Eugene J. Gerberg, Baltimore, Md., and John F. Benham, executive secretary, National Sprayer & Duster Assn., Chicago.

Social activities were numerous, highlighted by a party on Monday evening, and the annual banquet on Wednesday night, attended by over 700 persons. The convention was the largest in association history, with 622 registered. A considerable amount of difficulty was encountered by the committee due to a strike of employees at the Bellevue-Strafford. This condition made it necessary to hold social functions at the Penn-Sheraton hotel.

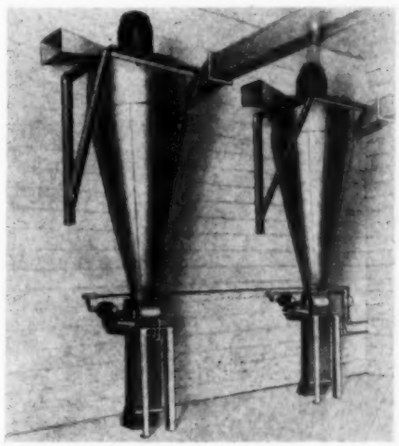
•

McKee to Cleary Corp.

W. A. Cleary Corp., New York, has announced the appointment of William N. McKee as industrial sales manager. He will have charge of germicide, fungicide and herbicide sales. Mr. McKee was formerly with the Shell Oil Company.

•

New Sprout, Waldron Device



Sprout, Waldron & Co., Muncy, Pa., have developed a new type pneumatic materials handling system which is adaptable to all types of grinders. The makers describe the "Pneu-Vac" as being specially designed to reduce product loss through collector exhaust by as much as 10 percent, and eliminates the need for a second filter collector. The entire system operates under reduced pressure so that injurious or objectionable dusts cannot escape, and the suction keeps the system free from insects. Material does not pass through the pneumatic fan located on top of the collector; an important factor when handling abrasive materials. The company states that friable materials are handled with a minimum of breakage. Above is pictured an actual installation of the Pneu-Vac system. Further details available from company, 100 Waldron St., Muncy, Pa.

•

Amecco in New Location

Amecco Chemicals, Inc. has moved its sales office and manufacturing operations to Henderson, Nevada, from its former location in New York. The firm expects to develop western markets for its chemical products, under the salesmanship of Robert W. Fredericks. Dr. Ernest B. Rubloff is technical sales development director. Both of these men are residents of Los Angeles, and have extensive knowledge of western markets.

The firm has disposed of its plant in Rochester, N. Y., and has acquired the plant of Hardesty Chemicals Co., Inc. at Henderson.

Make **HETP**
spread quicker and
wet better with NEW

TENLO 10

A wetting agent and surface tension reducer
very effective with low concentrations.

GRIFFIN CHEMICAL COMPANY
1000 SIXTEENTH ST · SAN FRANCISCO · CALIFORNIA

MUL - SI - MO

An Emulsifier of Petroleum Oils

Economical - Effective

MUL-SI-MO is especially adapted for the rapid emulsification of Oils whose viscosity is 120 Saybolt or less.

RANGE COVERED
Oils with a viscosity of 120 Saybolt or less cover the great majority of oils used in Dormant and Summer Sprays.

GENERAL TEXTURE
Mul-si-mo is a thin amber-colored oily liquid about the same viscosity as Kerosene Oil.

METHOD OF USE
There is nothing complicated about the use of *Mul-si-mo*. It is just poured into the oil to be treated at the rate of ½ to 1%, depending upon the tightness of emulsion desired—then thoroughly stirred—and the process is completed.

RESULT OF MIXING AS ABOVE
A practically 100% Oil Product— No Water— No Soap— No Potash nor other Alkalines.

NEUTRAL PRODUCT
Mul-si-mo is Neutral. Mul-si-mo-Made Emulsions are not adversely affected by pronounced saline, alkaline or acid re-acting waters.

ECONOMICAL TO USE —LOW COST
Mul-si-mo, we believe, is the cheapest and most economical Emulsifier on the market for the emulsification of the oils above specified.

NON-TOXIC TO PLANTS
Extensive tests have shown *Mul-si-mo* to be non-toxic to plants when used at a dilution of 1 to 100. (Plants used in tests—Coleus.) As summer oils are usually used at the dilution of half-gal. to 100 gals. water, at such dilution the rate of *Mul-si-mo* to water would be 1 to 20,

COST OF MUL-SI-MO
Per Gallon $4.00; 5 Gallons and up @ $3.75 per Gallon; 50 Gallon Drums @ $3.50 per Gallon, f.ob. New York or Jersey City.

MUL-SI-MO SAMPLES
A 4 Oz. Sample will be sent upon request.

Mulsimo Products, Inc.
CRANBURY, N. J.

PYRAX ABB FOR 1948

Plentiful supplies available for immediate shipment.

Our schedule for the months of March thru July is filling rapidly.

Avoid complications during the agricultural season by taking delivery of at least part of your order during the winter.

•

May We Hope For Your Cooperation?

R. T. VANDERBILT CO., Inc.
Specialties Dept.
230 Park Avenue . New York 17, N. Y.

For Many Years . . .

The trade has depended upon the service and good name of

DERRIS, INC.

For some of its most exacting needs.

4-5% Rotenone DERRIS Powder
4-5% Rotenone Cube Powder
5% Rotenone Oil Concentrate
1½% Rotenone Emulsifiable Concentrate
Cube Resins — with definite Rotenone Content

DERRIS, INC.
79 Wall St. New York 5, N. Y.
Factories and Laboratories, Metuchen, N. J.

Insecticide Fumers

Tobacco By-Products & Chemical Corp., Louisville, Ky., have placed on the market a new pressure-fumigator product, "Benzo-Fume," for the control of greenhouse red spider mite. The product contains 17.5 percent azobenzene. Two sizes are available: in single pound and half-pound cans as shown above. The material is distributed through internal pressure created by lighting the powder through a small hole punched in the side of the container by the operator. Under ordinary conditions, two one-pound cans will fumigate about 20,000 cubic feet. The smaller size is recommended for use in small, long, narrow greenhouses. Full details of the product are available from the company.

•

Wood Decay Article

The story of extensive experiments in the field of termite control and of studies in chemical control of fungus decay of wood is told in the September issue of the *Dow Diamond*, organ of Dow Chemical Co., Midland Mich. The story includes a number of photographs as well as a complete history of the use of pentachlorophenol in controlling wood destroyers. It presents information on the life history of termites, and data on the working of fungus "rot" particularly below the ground line of wooden structures.

•

Thompson-Hayward Expands

Thompson-Hayward Chemical Co., Kansas City, has recently purchased two new warehouses, one in Chicago and the other in Minneapolis; and has begun construction of a third at Wichita, Kansas. The Chicago acquisition replaces the warehouse facilities which were destroyed by fire in February. The new building is modern, and will provide some 30,000 square feet of floor space. The Minneapolis warehouse will provide 33,000 square feet of floor space. Under construction is the company's new warehouse at Wichita, which is expected to be ready for use about the first of the year.

In addition to its new warehouses, the firm has recently expanded its Kansas City facilities with the completion of one new building and the installation of additional manufacturing equipment. The company now operates sixteen midwestern warehouses in addition to the warehouse and manufacturing facilities at the home office.

•

Hand Truck Sprayer

Universal Metal Products Co., Saranac, Michigan, has announced production of its "Mobl-Spra," a rubber-tired, hand-pushed spraying device for use in gardens, dairy barns, and other farm buildings. It is equipped with 3½ gallon tank, hand pump, and detachable brass nozzle.

A Standard Carrier for Insecticidal and Fungicidal Dust

EMT CO.
23

TALC

This grade of talc has proper and efficient bulking characteristics

SOFT flaky particles which enhance stickiness.

COMPATIBILITY with all insecticides.

SOFTNESS which eliminates abrasion in dusting machine nozzels.

FINENESS — The proper fineness for complete coverage, determined by Entomologists.

UNIFORMITY of all qualities guaranteed by the largest manufacturer of the greatest variety of talcs in the world.

Working samples furnished free

•

Eastern Magnesia Talc Co., Inc.

Burlington Waterbury Johnson

VERMONT

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AVAILABLE FOR PROMPT SHIPMENT

EXCLUSIVE SALES AGENTS

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Tribune Tower, Chicago

for '48 it's

Toxaphene*

[HERCULES CHLORINATED CAMPHENE]

Hercules plant expansion assures an unfailing supply of Toxaphene for agricultural insecticides in 1948. Initial results of large-scale field tests indicate its effectiveness and economy —especially against cotton insects. Find out about Toxaphene *first* for '48!

HERCULES POWDER COMPANY
970 Market Street, Wilmington 99, Delaware

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KAOLIN CLAYS

VELVEX and TYPE 41

For use in extending DDT
and other insecticidal materials

APPROVED by entomologists, these clays have also met with general acceptance by mixers and blenders of agricultural insecticides.

- NON-ABRASIVE
- SMALL PARTICLE SIZE
- CHEMICALLY ADAPTABLE
- GOOD ADHESIVE QUALITIES

For information and samples, write:

SOUTHEASTERN CLAY COMPANY

AIKEN, SOUTH CAROLINA

Riedeburg Joins MGK

Theodore Riedeburg resigned his position as sales manager of the agricultural chemicals division of Westvaco Chlorine Products Co., Nov. 1, joining McLaughlin Gormley King Company, Minneapolis, in charge of sales in the eastern district. Mr. Riedeburg will have his temporary headquarters at his home at 63 Walnut Avenue, White Plains, N. Y., but expected shortly to announce the location of a New York office. He had been with Westvaco Chlorine Products Co. since October, 1946 and prior to that connection had been with Dow Chemical Company, Midland, Michigan.

THEODORE RIEDEBURG

•

Pyrethrum Price Drops

A reduction of approximately 20 percent in the price of Kenya pyrethrum flowers has been announced by George E. Nixon, president of Greene Trading Co., Inc., New York importers. He states that the pyrethrum producers in Kenya, East Africa, have agreed to the price reduction, and that the new schedule is now in effect. Mr. Nixon stated further that "more favorable terms and conditions of sale" have also been established. Kenya flowers are guaranteed to carry 1.3 percent pyrethrins, according to contracts.

•

Velsicol Salesman Dies

Pierce C. Calton, 39, sales representative for Velsicol Corporation, Chicago, was killed in October by a hitch-hiker he had befriended. The accident happened near Nashville, Tenn., in Mr. Calton's sales territory. The victim leaves a widow and a 13-year-old son, Pierce Jr.

•

Need For Nitrogen Told

In a report covering an inventory of U. S. resources in connection with rendering aid to foreign countries, Secretary of the Interior, J. A. Krug on October 18 emphasized the world need for fertilizer materials, especially nitrogen. He stated that foreseeable nitrogen expansion will take care of the U. S. demand only, and that "special measures" are needed to cover the over-all situation. This may include cuts in industrial uses and diversion of fertilizer from the U. S. to Europe, it was stated. The report declared that the current low level of food production in many countries is due in part to a lack of fertilizer supplies and to accumulated

HAVE YOU TRIED THIS TIME-TESTED ALL-PURPOSE TEAR GAS FUMIGANT?

Larvacide

KILLS RODENTS
Light dosage drives rats out of retreats to die on the open floor. No carcass nuisance. Easy, economical control in warehouses, burrows, farms, food plants, etc., is assured by over-night fumigation with Larvacide.

KILLS MOST SOIL PESTS
Larvacide controls most nematodes, wilts, soil insects, root rots, damping off and weed seeds. Applied a week or ten days before planting.

KILLS WAREHOUSE PESTS
Ideal for industrial fumigation. Controls flour moth grain beetle, drug store beetle, etc. Larvacide gets into cracks, crevices, inside seeds. Kills larvae and egglife as well as adult insects.

SEE ISCO Headquarters for Soil Fumigation.

LARVACIDE Easily applied with your own equipment or on contract application. Equipment available for large and small jobs. Larvacide is recommended particularly for greenhouse, sunbed and compost soil.

ISCOBROME Controls most nematodes, soil insects and many soil fungi, without danger to living plants nearby. Ideal for greenhouse use—permits safe planting in 4 to 5 days.

ISCOBROME D Best bet for low-cost field treatment to control nematodes and wireworms. No equipment corrosion, high flash point. Easy to apply with small applicators or with large field rigs.

Write today for full information on these Isco products.

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BOSTON CHICAGO CINCINNATI CLEVELAND OMAHA PHILADELPHIA

Basic Chemicals for Agriculture

KOLKER

» DDT

» 2,4-D

Acid
Sodium Salt
Triethanolamine Salt
Isopropyl Ester
Butyl Ester

KOLKER CHEMICAL WORKS
80 Lister Avenue Newark 5, N. J.

for '48 it's Toxaphene*

[HERCULES CHLORINATED CAMPHENE]

This new Hercules toxicant has proved itself in effectively controlling cotton insects, grasshoppers, Mexican bean beetles, tobacco hornworms and budworms, sugar cane borers, bagworms, rice stinkbugs, and other insects which attack crops. Find out about Toxaphene *first* in '48!

HERCULES POWDER COMPANY
INCORPORATED
970 Market Street, Wilmington 99, Delaware

*TRADE MARK OF HERCULES POWDER COMPANY N77-9F

STATEMENT OF OWNERSHIP

Statement of the ownership, management, circulation, etc., required by the Acts of Congress of August 24, 1912, as amended by the acts of March 3, 1933 and July 2, 1946 of Agricultural Chemicals, published monthly at Baltimore, Md., for October 1, 1947.
State of New York, County of New York.

Before me, a Notary Public in and for for the State and County aforesaid, personally appeared Lawrence A. Long, who, having been duly sworn according to law, deposes and says that he is the Managing Editor of Agricultural Chemicals and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933 and July 2, 1946 in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Industry Publications, Inc., 254 W. 31st St., N. Y. 1; Editor, Ira P. MacNair, 254 W. 31st St., N. Y. 1; Managing Editor, Lawrence A. Long.

2. That the owner is: (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Industry Publications, Inc., 254 W. 31st St., N. Y. 1; Ira P. MacNair, 254 W. 31st St., N. Y. 1; Grant A. Dorland, Russell Cave Pike, Lexington, Ky.; Wayne E. Dorland, 254 W. 31st St., N. Y. 1.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state). None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stocks, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, is paid subscribers during the months preceding the date shown above is———. (This information is required from daily publications only.)

LAWRENCE A. LONG, Managing Editor

Sworn to and subscribed before me this 1st day of October, 1947.

HARRIET LEVINE, Notary Public.

Bronx County Clerk's No. 56. New York County Clerk's No. 624.
Commission Expires March 30, 1948.

deficiencies of fertilizer applications during the war. Nitrogen is considered of first importance for immediate increases in crop production, but fertilizer phosphate and potash are necessary to the long term preservation of the fertility of soil.

•

NAIDM Baltimore Meeting

The National Association of Insecticide and Disinfectant Manufacturers will hold its 34th annual meeting in Baltimore, Md., December 1, 2 and 3 at the Lord Baltimore Hotel. A tentative program has been announced which includes discussion of the new Federal Insecticide and Fungicide Act and the regulations for its enforcement; a talk on "The Federal Trade Commission's Place In Your Business," and another paper on "What the Office of Small Business Can do for Your Business." A symposium is planned on the subject of "What Has Happened to the Insecticide Business?"

On the technical side there will be talks on rodenticides, residual effects of insecticides on flies, and "Insecticidal Surface Coatings." In addition, there will also be three clinics providing for discussions of insecticides, disinfectants, and sanitary products.

•

Titles Wrongly Stated

In the A.I.F.A. advertisement in the October issue of AGRICULTURAL CHEMICALS, the titles of certain Association directors were given in error. The publication regrets this mistake which appeared when corrections noted by the A.I.F.A. office failed to be made.

•

Brunton's Injuries Healing

Jack Brunton, eastern sales manager of the agricultural chemicals division of Pennsylvania Salt Manufacturing Co., Philadelphia, is apparently on the road to recovery from serious spinal injuries suffered in a fall at the A.I.F.A. convention in September. He is still wearing a brace, but is able to get around almost as of old. Overlooked in earlier examinations, however, was a damaged hand which x-rays indicate must also undergo some treatment.

FERTILIZER PAPERS

(*Continued from Page 33*)

is expressed in a mathematical expression as follows:
$y = 8.3285 + 1.1965\,x - 0.0464\,x^2$;
where y is the CaO and x the P_2O_5 content.

In 1900, all fertilizers supplied 486,000 tons of CaO to the soil as compared with 417,000 tons from liming materials. In 1945, fertilizers supplied 2,531,000 tons and soil amendments 9,316,000 tons of CaO to agriculture.

"Soluble Sources of Calcium in Plant Growth" was presented in a paper by J. F. Reed and R. W. Cummings. They discussed the effects of calcium as a nutrient element, and gave the results of various investigations on additions of soluble calcium, particularly as compared with lime applications. The application of cal-

● Immediately available, this new and improved post-war-planned product is ready to give you the optimum protection against pests and fungous diseases.

Here are some quick facts on Micron Measured Sulphur. Read them over carefully and you'll have to agree that Micron Measured Sulphur is a natural for the control of scab on apples and brown rot on peaches.

1. PARTICLE SIZE—Between 4 & 5 microns, surface average diameter, which is 10 times finer than the opening in a 325 mesh screen.
2. SULPHUR CONTENT—Wettable not less than 95%. Dust not less than 90%.
3. EXCELLENT COVERAGE AND ADHERENCE—Extremely fine particles give even distribution over fruit and leaf surfaces forming a protective layer which withstands weathering.
4. EASY TO HANDLE—Micron Measured Wettable Sulphur goes into suspension immediately upon being placed in the spray tank. Micron Measured Dusting Sulphur is non-lumping and free-flowing.
5. NO LOSS—Both wettable or dusting can be stored without deteriorating or lumping.

CONTROLS THESE PESTS

The pests shown below can be controlled under average conditions by the use of Micron Measured Sulphur. Consult your local agricultural authority for recommendations as to the amount of spraying or dusting sulphur to use.

APPLES, PEACHES, PEARS, CHERRIES AND PLUMS: Brown Rot, Scab, Red Spider.
GRAPES AND STRAWBERRIES: Powdery Mildew, Red Spider.
CURRANTS, GOOSEBERRIES AND RASPBERRIES: Powdery Mildew
BEANS AND PEAS: Powdery Mildew
CITRUS: Rust Mite, Scale Crawlers, Red Spider
ROSES, PERRENIALS, ORNAMENTAL SHRUBS AND OTHER PLANTS: Black Spot, Powdery Mildew.

STAUFFER CHEMICAL CO.
420 Lexington Ave., New York 17, N. Y.

Stauffer CHEMICALS SINCE 1885

221 N. La Salle St., Chicago 1, Ill.
M & M Building, Houston 2, Texas

cium salts on various crops was reviewed. Data were presented from recent experiments involving the use of calcium sulfate on peanuts. This crop requires calcium in the soil area in which the peanut fruit is formed. The required level of calcium in this zone is largely independent of the calcium supply in a soluble form when the peanuts are beginning to fruit, the paper stated. The effect of such factors as variety of peanuts and type of soil colloid was emphasized.

In a study of calcium content of soils and fertilizers in relation to composition and nutritive value of plants, C. E. Smith and J. B. Hester stated that there is need for a re-examination of soil-plant- animal relationships that begins with a study of soil properties and soil fertility balance, changes in availability of other minerals as influenced by liming, changes in plant composition, and finally the effect on growth and reproduction of animals consuming these plant materials. Although the amount of influence of lime and calcium-bearing materials on plant composition is a controversial issue, there is agreement that plants from soils very low in available calcium may cause nutritional disorders when used as feed.

The authors stated that evidence continues to accumulate that animals can detect differences in plant composition not evident from routine mineral analyses. There is an increasing amount of information that animal well-being and the composition of animal products are closely associated with those soils that furnish a balanced supply of nutrients.

In a paper discussing new production and fertilizer supplies for 1947-48, F. S. Lodge of the National Fertilizer Association stated that fertilizer consumption has more than doubled the average of the five pre-war years, 1935-39, increasing from an average of 7,350,000 to 14,900,000 tons in 1946. The supply is still not sufficient to meet all demands. Despite war emergency prohibitions and scarcity of materials and labor, the industry has been able to build some 50 new plants during and immediately after the war, and as many more are under construction or in the blue-print stage. The industry has taken over the operation of five of the government-built synthetic nitrogen plants and their products are largely going for agricultural use. One ammonium phosphate plant is in operation and another projected. At least four new concentrated super-phosphate plants are being built. Some 25 new plants or additions to normal super-phosphate plants and 50 dry mixing plants have been completed. Plans are in the making for more he said.

The supply situation is problematical, he continued, as strikes or other labor problems in the coal, steel, or other key industries could dangerously curtail supplies. At the moment it appears that there will be about 9 per cent more nitrogen, 10 per cent more phosphoric acid, and 3 per cent more potash during the

for '48 it's

Toxaphene*

[HERCULES CHLORINATED CAMPHENE]

Ample supplies of this new Hercules toxicant will be available for insecticide manufacturers in time for 1948 demands. Users will look for the words "Toxaphene" or "Chlorinated Camphene" on the label. Find out about Toxaphene *first* in '48!

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970 Market Street, Wilmington 99, Delaware

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N17-9E

SODIUM SELENATE

NOW

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Inquiries Invited

R. T. VANDERBILT CO., Inc.

Specialties Department

230 PARK AVENUE

NEW YORK 17, N. Y.

fiscal year than was on hand last year. These calculations do not include production in army-controlled nitrogen plants being operated to produce materials for shipment to occupied areas overseas.★★

TECHNICAL BRIEFS

(*Continued from Page 49*)

rows with a middle-burster and then pouring the materials at the proper rate in the bottom of each furrow, covering them immediately with a turnplow. The bed or list thus prepared was not disturbed afterward. Fertilizer was applied on either side of the bed and fresh list made with two additional turnplow furrows. The tobacco plants were then set directly over the furrow where the stream of fumigant had been applied. Tests have indicated that good control can be secured with slightly less material per acre by using the drill method of application. However, the broadcast method was considered to be more practical under average conditions.

LISTENING POST

(*Continued from Page 45*)

in apple orchards, received from the Hudson River Valley early in October, indicates that severe injury by the codling moth in that area has been confined to a few orchards but that light infestations are somewhat more general than last year. Most growers in the area apparently did a good job of control. Injury by the red-banded leaf roller is general there but is light in most instances. Damage from the apple maggot is more prevalent in eastern New York than during the past several years.★★

LABELING PROBLEMS

(*Continued from Page 20*)

check the proposed label with the enforcement officials. They will gladly review it. This does not necessarily bind them to accept its final printed form, because typography and layout play a part. Nevertheless it puts you on much safer ground.

All this amounts to a large mass of advice. Its object is to help toward more effective and more ethical merchandising. To go on now past the subject of labeling, let me point out that many producers also are checking their advertising.

No one wants to hamper the initiative and creative ideas of his advertising department, unnecessarily. Nevertheless the copy should be checked against the label—to make sure that the claims are not substantially different. That is important. Failure to do such checking in the past has caused most of the difficulties with the advertising.

My talk has been advice to companies. If I were to turn now to the consumer and attempt to advise him in turn, I would say just this: "Always buy the product of a good and reputable company—the kind that's interested in such advice."

For Your

CONVENIENCE...

If you're located in the New England or Middle Atlantic States you should investigate our new warehouse and plant facilities at Hicksville, Long Island.

Almost 40,000 square feet of well planned storage space enables us to maintain adequate stocks of most every agricultural material. A direct railroad siding and ample platform facilities for truck deliveries and pick-ups assure speedy handling and dispatch of all orders. Our special small package department repacks numerous agricultural specialties . . . . 5, 10, and 25 lb. packages on dry materials . . . . 1 quart, 1 gallon and 5 gallon containers on liquids.

AVAILABLE From One Source

A complete list of agricultural products for the dealer backed by a quarter century of experience in serving the agricultural field.

INSECTICIDES	FEED STUFFS	FUNGICIDES
FERTILIZERS	SEED PROTECTANTS	WEED KILLERS

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An excellent carrier for insecticides and fungicides. Produced by

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Dalton - - Georgia

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Results to date of tests conducted on thousands of acres of farmland during 1947 confirm the effectiveness and economy of agricultural insecticides made with Toxaphene—Hercules new agricultural toxicant. Find out about Toxaphene *first* for '48!

HERCULES POWDER COMPANY
INCORPORATED
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Agricultural Chemicals
254 W. 31st St. New York 1, N. Y.

WASHINGTON MEETINGS

(*Continued from Page 37*)

lahassee, Fla., talked on Labeling for Minor Plant Foods."

Dr. W. H. MacIntire, Knoxville, Tenn., explained the processes involved in TVA fused calcium and calcium-manganese phosphates. Dr. W. L. Hill of the U. S. D. A. Fertilizer Division presented a technical paper on "Other New Phosphates," and Dr. S. F. Thornton, Royster Guano Co., Norfolk, Va., discussed many of the control problems in the fertilizer industry.

Describing the type and amounts of equipment which should be carried by the fertilizer inspector, Dr. B. D. Cloaninger, Clemson, S. C. told the group that efficient and readily-available equipment for testing should always be with the inspector.

Two papers discussing control problems of liming materials were presented. Dr. T. F. Hoffman, Richmond, Va., prepared a paper on "Labeling, Enforcement, Penalties"; and E. R. Collins, Raleigh, N. C. spoke on "Particle Size." Dr. J. F. Fudge, College Station, Texas, explained the use of fertilizer tonnage data. A question-and-answer period followed to bring out further points for discussion.

Delegates registered at the fertilizer meeting were invited to attend banquets given by the National Fertilizer Association, and the American Plant Food Council on Monday and Tuesday nights, respectively.

Feed Control Officials

OCTOBER 23 and 24 saw the thirty-seventh annual convention of the Asociation of American Feed Control Officials, Inc., at the Shoreham. The group elected Wm. Hunter, Sacramento, California, president; A. M. G. Soule, Augusta, Maine, vice president; and re-elected L. E. Bopst, College Park, Md., secretary-treasurer. The former presi- and vice-president were respectively, Paul Ijams, Topeka, Kansas, and Mr. Hunter, now president. The executive committe is composed of the three officers, John B. Smith, chairman, of Kingston, Rhode Island; and J. J. Taylor, Tallahassee, Florida. Mr. Taylor succeeds H. A. Halvorson, St. Paul Minn., whose term expired this year.

The program opened Thursday morning with an address by W. A. Queen, Chief, Division of State Cooperation, Food and Drug Administration, Washington, D. C. His talk was followed by L. E. Bopst, association secretary-treasurer, who presented his annual report. President Paul Ijams, Topeka, Kansas, addressed the group, and was followed by Walter C. Berger, president of the American Feed Manufacturers' Association, Inc., Chicago. Mr. Berger discussed the mutual objectives of the two organizations. Further talks on food subjects were made by H. R. Bird, biochemist in charge,

What Brand of DDT

is Upholding the Reputation of Your Products?

If you are using Geigy GESAROL* and NEOCID* DDT compositions you can be sure that the DDT content of your finished preparations is the finest obtainable.

Further, when you deal with Geigy you get "facts from the source" —*proven* facts—direct from the *"Originators of DDT Insecticides."*

Geigy's recommendations are backed by eight years of continuous experience in DDT compounding and application.

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GEIGY COMPANY, Inc.
89 Barclay St., New York 8, N.Y.

ORIGINATORS OF DDT INSECTICIDES

Poultry Nutrition Investigations, U. S. D. A., Beltsville, Md.; Lyman Peck, consultant, Research Applied Feeding Service, Chicago; and A. K. Barta, Proprietary Association of America, Washington.

On the program of Friday, papers were presented on further feed topics. Speakers included C. R. Gutermuth, vice-president, Wildlife Management Institute, Washington; George M. Lewis, Director, Department of Marketing, American Meat Institute, Chicago; Bernard L. Oser, Director, Food Research Laboratories, Inc., Long Island City, N. Y.; and A. J. Lehman, Chief, Division of Pharmacology, Food and Drug Administration, Washington. The meeting ended with a business meeting, committe reports, and election of officers, as reported on page 69 of this issue.

DEFOLIATION

(*Continued from Page 27*)

do the job. Sulfuric acid has been used effectively, but will not come into general use because of its corrosive action on the average farm equipment. It not only requires specialized equipment, but also great care on the part of the operator to avoid contact with the chemical. A number of dinitro compounds have been tested, some of which are available on the market. In general, the action of this group of compounds in killing potato tops is quite rapid. Certain investigators have attributed to this rapidity of killing, the tuber discoloration which has been observed to occur with the use of certain top-killers. It has been reported less likely to occur, if a material is used which kills the foliage more slowly. Further study is needed to provide the answer to this question. The use of "Aero Defoliant" as a top killer depends on its application at an increased rate over that required for defoliation purposes. Around 100 pounds per acre, applied a week or ten days before digging, has proved satisfactory under average conditions. It is especially suited to areas which are equipped for dusting and not for spraying.

Application Method

ANY standard dusting equipment which distributes the dust evenly over all the foliage will give satisfactory results. Since it affects only the leaves covered, a special effort must be made to get uniform distribution throughout the foliage. Moisture is required to put the material into action, and it must therefore be applied when dew is expected or when plants are actually wet with dew. If dew is predicted by the weather bureau, application can be made in the evening, if this is more convenient.

Airplane distribution is probably more economical and effective than other methods of application, provided the land area is suitable to use of the plane. If ground dusting equipment is used, power-driven blowers will prove more effective than the traction-power type.

In view of the possible injury to other crops in adjoining fields from any herbicidal material, care should be taken to avoid drifting when it is applied. It is very desirable, of course, to choose a time when there is little or no wind to interefere.

Best results are obtained if the plant is in a healthy, growing condition at the time of application. Under conditions of extreme drought, when the leaves become permanently wilted and do not revive over night, there is not enough physiological activity in the leaf for plants to defoliate well. Rains following drought conditions tend to revive the plants, and fields have been successfully defoliated following rain, where defoliation had failed at an earlier date.

Since dew or moisture is necessary to put these chemicals into action, they cannot be used with success to defoliate cotton or other crops in the arid regions of the Southwest or extreme West where dew seldom occurs. Preliminary experiments with a material which can be applied in liquid or spray form have given very promising results. Further testing of such materials is in progress, with the hope that a suitable defoliant can be found to supply the urgent demand of cotton farmers in the dry areas.

Announcing

Eston HETP

HEXAETHYL TETRAPHOSPHATE

The amazing new insecticide for control of Aphids, Spider Mites and many other insects.

NOW AVAILABLE IN QUANTITY

BIOLOGICALLY TESTED ... Each drum checked before shipment.

HIGHER TOXICITY because of new manufacturing process.

TECHNICAL ASSISTANCE for processors and users.

ALSO AVAILABLE:

HEXON 50 and 90. A 50% and 90% solution of Hexaethyl Tetraphosphate with suitable solvent and wetting agent. Write or wire today for full price and technical information.

OTHER *Eston* CHEMICALS insecticides...soil and space fumigants...refrigerants.

The West looks to Eston for chemicals

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Los Angeles 23, California

Industry Patents

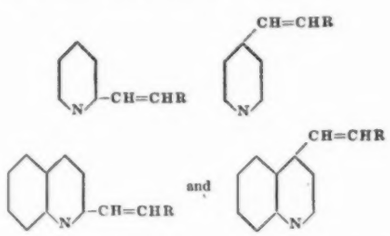
The following patents have recently been issued by the U.S. Patent Office on products and devices in the agricultural chemical field. Copies of the patents may be obtained at 25c each by addressing the U.S. Patent Office, Washington 25, D.C.

2,426,214. INSECTICIDAL OIL SPRAY. Patent issued August 26, to Charles K. Hewes, Los Angeles, Calif., assignor to Richfield Oil Corporation, Los Angeles. An insecticidal composition including an insecticidal kerosene fraction of mineral oil and aluminum salt of the group consisting of aluminum stearates, aluminum palmitate, and aluminum oleate, the aluminum salt being mixed with a member of the group consisting of lower boiling alcohols, glycol, and glycerine.

2,426,349. P-CHLORO-ACETOPHENONE SEMI-CARBAZONE AS AN INSECTICIDE. Patent issued August 26 to Samuel I. Gertler and Herbert L. J. Haller, Washington, D. C., assignors to the U. S. of America, as represented by the Secretary of Agriculture. An insecticidal dust composition comprising p-chloroacetophenone semicarbazone in the form of an impalpable powder admixed with a solid diluent.

2,426,864. FUNGICIDES. Patent issued September 2, to Lloyd Crosser Felton, Baltimore, Md., assignor to Hynson, Westcott & Dunning, Inc. A fungicidal composition consisting essentially of 3, 5 dibromsalicylaldehyde and borax, said composition when dissolved in water having a pH value of from 7 to 8.5.

2,427,286. INSECTICIDE AND METHOD OF USING. Patent issued Sept. 9, to William A. Knapp, New York; and Leon J. Heuser, Glen Ridge, N. J., assignors to General Chemical Corp., New York. An insecticide comprising an emulsifying agent and as an active insecticidal ingredient a compound selected from the group consisting of:



in which R denotes an organic radical containing from 3 to 9 carbon atoms.

2,427,677. HALOGENATED QUINOLINE INSECTICIDES. Patent issued Sept. 23 to William A. Knapp, New York, assignor to General Chemical Co., New York. The method of combatting sucking insects which comprises distributing upon the insect a contact insecticide comprising a halogenated quinoline.

2,427,987. APPARATUS FOR DISCHARGING INSECTICIDE FROM AIRPLANES. Patent issued September 23, to Arch C. Wilson, West Palm Beach, Fla.

In combination with the fuselage of an airplane, a gravity feed hopper for finely divided insecticide mounted in said fuselage with the bottom thereof depending below the same, means at the bottom of said hopper forming a wind passageway below the same of elongated form transversely of the fuselage opening forwardly and rearwardly of the fuselage with closed sides and a bottom and into which insecticide from the hopper is adapted to discharge to be blown rearwardly by wind passing through said passageway, and means operative to variably control quantity discharge from said hopper and to simultaneously restrict said passageway into rearwardly tapering form and thereby vary the velocity of the wind passing through the passageway, said bottom of the passageway comprising an air foil having the form of an airplane wing for creating a vacuum on top thereof to cause when the fuselage is in flight a vacuum in the bottom of the passageway facilitating discharge from the hopper.

Trade Mark Applications

PENCO, in stencil capital letters, for insecticides. Filed Nov. 10, 1945 by Pennsylvania Salt Manufacturing Co., Philadelphia. Claims use since Mar. 19, 1945.

RAT BUTR, in capital letters, for poison paste for rats. Filed Nov. 13, 1946, by Frank L. Wiley, doing business as Oneida Chemical Co., Utica, N. Y. Claims use since November, 1936.

CUBTOX, in sans serif capital letters, for insecticides. Filed Nov. 15, 1946, by R. A. Cobb, Houston, Tex. Claims use since Nov. 7, 1946.

DIMOLE, in sans serif capital letters, for fungicidal spray for use in tobacco plant beds. Filed May 21, 1947, by Woolfolk Chemical Works, Ltd., Fort Valley, Ga. Claims use since December, 1946.

D-D., in capital letters, within shell motif, for soil fumigant. Filed Feb. 24, 1947, by Shell Chemical Corp., San Francisco, Calif. Claims use since Nov. 15, 1946.

ANNVILLE STONE CO., HERSHEY, PA., letters on drawing of anvil, within drawn circle, for pulverized agricultural limestone and fertilizers. Filed Nov. 29, 1946, by Annville Stone Co., Conshohocken, Pa. Claims use since Nov. 7, 1946.

IRON-8, in slender capital letters, for chemical products for use in combatting insects and fungi. Filed Nov. 7, 1946, by Monsanto Chemical Co., St. Louis. Claims use since Oct. 2, 1946.

MAGNESIUM-8, in slender capital letters, for chemical products for use in combatting insects and fungi. Filed Nov. 7, 1946, by Monsanto Chemical Co., St. Louis. Claims use since Oct. 2, 1946.

GAMMER, in ultra Bodoni capitals, for stock dip. Filed Apr. 25, 1947, by William Cooper & Nephews, Inc., Chicago. Claims use since Apr. 5, 1947.

TRIM IT, in outline capital letters, with word "trim" over the other word, for weed killing sprayable liquids. Filed Apr. 28, 1947, by the Trimit Co., Baton Rouge, La. Claims use since Mar. 1, 1947.

NEU-CAL, in sans serif capitals, for insecticidal composition for use on plants. Filed May 22, 1947, by Food Machinery Corporation, San Jose, Calif. Claims use since Mar. 7, 1947.

VELSICOL 1068, within panel across circular background with outlined letter "V" showing panel and in front of circle. Filed Mar. 5, 1947 by Velsicol Corp., Chicago. Claims use since Feb. 11, 1947.

GY-COP, in heavy capital letters, for insecticides and fungicides. Filed Apr. 4, 1947, by Geigy Co., Inc., New York. Claims use since Mar. 24, 1947.

SPROUCHECK, in slender capital letters for sprout inhibitor. Filed Apr. 12, 1947, by American Cyanamid Co., New York. Claims use since Mar. 17, 1947.

PENPHENE, in capital and lower case letters, for insecticides. Filed Apr. 26, 1947, by Pennsylvania Salt Manufacturing Co., Philadelphia. Claims use since Mar. 25, 1947.

BLADEX, in stencil capital letters for insecticide. Filed May 16, 1947 by Shell Oil Co., Inc., San Francisco, Calif. Claims use since Mar. 5, 1947.

VANCIDE, in capital and lower case letters, slanting upward. For fungicides, bactericides, and insecticides. Filed May 16, 1947, by R. T. Vanderbilt Co., Inc., New York. Claims use since May 1, 1947.

PARZATE, in caps and small caps, for agricultural fungicide. Filed June 14, 1947, by E. I. duPont de Nemours & Co., Wilmington, Del. Claims use since May 16, 1947.

VERSA-TOL, in hand-lettered style, for insecticides. Filed June 19, 1947, by Andrew Wilson, Inc., Springfield, N. J. Claims use since Jan., 1947.

VOTOL, in hand-lettered caps and lower caase, for insecticides. Filed June 25, 1947, by Waltham Chemical Co., Waltham, Mass. Claims use since June 5, 1947.

PAN PEACH SPRAY, capital letters within box, with globe motif behind letters, for insecticide and fungicide. Filed June 27, 1947 by Woolfolk Chemical Works, Ltd., Ft. Valley, Ga. Claims use since May, 1932.

HETP, in capital letters, for insecticides for control of mites and aphis. Filed May 21, 1947 by John Powell & Co., Inc., New York. Claims use since March 31, 1947.

MERCAN, in capital letters for fungicides used as an application to seeds for the control of seed born fungi. Filed May 21, 1947, by John Powell & Co., Inc., New York. Claims use since Jan. 2, 1947.

STANOLIND, in stencil capital letters, for insecticides. Filed June 28, 1947, by Standard Oil Co., Whiting, Ind. Claims use since Nov. 19, 1936.

NOTT'S, in rope motif, with knots tied in the rope, for herbicides, insecticides, animal repellents, and insect repellent ointments. Filed Oct. 7, 1946, by Robert H. Harkins, doing business as Nott Mfg. Co., Mt. Vernon, N. Y. Claims use since April 11, 1946.

DUZ MOR, in Gothic capital letters, for louse powder for poultry, livestock, and dogs. Filed Dec. 3, 1946 by Fred H. Moore, doing business as Hilltop Laboratories, Minneapolis, Minn. Claims use since March, 1943.

NIC-CARBO-MOR, in small capital letters, for poultry delouser. Filed Dec. 3, 1946 by Fred H. Moore, doing business as Hilltop Laboratories, Minneapolis, Minn. Claims use since June, 1941.

OVAL PEN AND INK DRAWING, in oval shape with torch motif super imposed on front, and blank panel across front for lettering. For liquid insecticide containing DDT (in addition to other products for motor cars). Filed Dec. 30, 1946, by American Oil Co., Baltimore. Claims use since July 2, 1946.

TENSITE, in capital letters slanting upward, for insecticides. Filed Dec. 30, 1946, by Cenol Co., Chicago, Ill. Claims use since Dec. 2, 1946.

NUODEX, in stencil capital letters, for fungicides, insecticides, bactericides, compositions for agricultural pest control, mildew-proofing compositions, rot-proofing compositions, and marine anti-fouling compositions. Filed Feb. 20, 1947, by Nuodex Products Co., Elizabeth, N. J. Claims use since 1924.

THREE LITTLE BOTTLES THAT BUILT THE PLANT, the first three words above, and the remainder below a drawing of three bottles, for fungicides, insecticides, bactericides, compositions for agricultural pest control, mildew-proofing compositions, and marine anti-fouling compositions. Filed Feb. 20, 1947, by Nuodex Products Co., Inc., Elizabeth, N. J. Claims use since 1937.

KARMEX, in hand-drawn outline capital letters, for weed killing compound. Filed May 2, 1947, by E. I. duPont de Nemours & Co., Inc., Wilmington, Del. Claims use since May 2, 1946.

ORBISCIDE, in capital letters, for insecticides. Filed June 18, 1947, by Orbis Products Corp., New York. Claims use since Nov. 25, 1946.

VERDOL, in stencil capital letters, for insecticides. Filed June 28, 1947, by Standard Oil Co., Whiting, Indiana. Claims use since Feb. 9, 1929.

NU-LEAF, in sans serif capital letters, for fertilizers. Filed Aug. 12, 1946, by California Spray-Chemical Corp., Richmond, Calif. Claims use since July 1, 1946.

BERCO, in heavy capital letters, for insecticides. Filed June 27, 1946, by Berwyn Chemical Co., Inc., Berwyn, Pa. Claims use since Nov. 20, 1945.

RAPITOX, in sans serif capital letters, for active chemical ingredient for use in manufacture of insecticides. Filed Dec. 11, 1946, by Hercules Powder Co., Wilmington, Del. Claims use since Nov. 8, 1946.

AMOCO, in heavy capital letters within torch-oval. For insecticide containing DDT, disinfectant and anti-freeze solution. Filed Dec. 17, 1946, by American Oil Co., Baltimore. Claims use since July 2, 1946.

GAVICIDE, in outline capital letters, for insecticides, and fungicides. Filed Feb. 7, 1947, by Pacific Guano Co., Berkeley, Calif. Claims use since September, 1944.

BENZOPHEN, in small capital letters for fungicide lotion for the treatment of animals. Filed Feb. 25, 1947, by Day Chemical Co., Newark, N. J. Claims use since Nov. 1, 1929.

ORTHENE, in sans serif capital letters, for parasiticides: namely insecticides and fungicides, herbicides, spray adjuvants, soil fumigants, animal repellants, germicidal detergents and compounds which influence specific physiological processes in plants. Filed Mar. 10, 1947, by California Spray-Chemical Corp., Richmond, Calif. Claims use since Feb. 7, 1947.

SOCIAL, in sans serif capital letters, for insecticidal carriers and solvents. Filed March 10, 1947 by Standard Oil Co. of California, San Francisco. Claims use since November, 1934.

GAMMOL, in heavy capital letters, for parasiticides, namely, insecticides and fungicides. Filed April 15, 1947, by California Spray-Chemical Corp., Richmond, Calif. Claims use since Mar. 20, 1947.

LEXONE, in script caps and lower case, for insecticides and insecticidal compositions. Filed Apr. 18, 1947, by E. I. duPont de Nemours & Co., Inc., Wilmington, Del. Claims use since Feb. 5, 1947.

PYROCIDE MULTICIDE, The letters P and M extending over the other letters, white on dark background, for insecticides and concentrated extracts for use therein. Filed May 24, 1947, by McLaughlin Gormley King Co., Minneapolis, Minn. Claims use since Apr. 17, 1947.

APS, in tall capital letters, for aromatic hydrocarbon solvents to be used in the manufacture of insecticide concentrates. Filed May 26, 1947, by John Powell & Co., Inc., New York. Claims use since on or about Feb. 7, 1946.

QD, in tall capital letters for fungicides, antiseptics, disinfectants, and germicides. Filed May 26, 1947, by John Powell & Co., Inc., New York. Claims use since on or about Mar. 31, 1947.

THERMO-PHOS, in capital letters, for phosphatic fertilizers. Filed Apr. 23, 1947, by Permanente Metals Corp., Oakland, Calif. Claims use since on or about Aug. 31, 1946.

RAT-TU, in capital letters, for preparation for killing rats and other rodents. Filed Oct. 25, 1946, by Robert H. Harkins, doing business as Nott Manufacturing Co., Mt. Vernon, N. Y. Claims use since Oct. 8, 1946.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 1st of month.

Positions Open

Salesman Wanted by a national manufacturer of insecticides and fungicides: 1 salesman, preferably with agricultural education or background, to cover area in Northern California. Straight salary plus traveling expenses. Address Box 196 care of Agricultural Chemicals.

Economic Entomologist Wanted: To serve in technical service capacity for prominent manufacturer of insecticides and fumigants. Duties will include technical liaison between sales, research and customers. Travel required from New York City base. Fundamental training in entomology and some field experience required. Include resume of training, experience, personal data, salary requirements and recent snapshot, if available, in reply. Address Box 197 care of Agricultural Chemicals.

Two Salesmen Wanted: By national manufacturer, two salesmen, one to travel Pennsylvania and one Carolinas, technically trained in horticulture and entomology, to sell insecticides, fungicides, herbicides. Salary, bonus, traveling expenses. Address Box 198 care of Agricultural Chemicals.

Wanted Insecticide Sls. Mgr: Insecticide sales manager for Midwestern mfgr. entering retail insecticide field. Four thousand established outlets on other products manufactured by the company. Excellent opportun-

ity for man experienced in the sale of insecticides. Address Box 199 care of Agricultural Chemicals.

Wanted: Energetic young man, experienced in agricultural insecticides. Must be capable directing sales and manufacturing program. Newly organized insecticide company has real opportunity for right man. Write Valley Chemical Co., Greenville, Mississippi, giving full details, experience, education, age and expected salary.

Insecticide Sales—Man experienced in field wanted by leading manufacturer located in East. Position would entail covering cotton belt and southwest. Good opportunity with future for right man. Give full details, experience, etc., to Box 201 care of Agricultural Chemicals.

Position Wanted

Chemist, B.S. 1943 desires technical sales position. Familiar with insecticides—DDT, piperonyl butoxide, benzene hexachloride, chlordane, etc. . . . also synthetic resins. Will travel. Address Box 200 care of Agricultural Chemicals.

Miscellaneous

Private Label Packaging — Large modern plant in mid-west can pack large or small lots of cartons, cans, bags, barrels, and also supply most type packages and many chemicals if required for your private label product. If you have a private brand problem, consult us. Address Box 202 care of Agricultural Chemicals.

For Sale: Technical DDT powder packed in 5 lb. tins, six tins to the case. Any quantity up to 15,000 lbs. Minimum setting point 89 degrees. For further details, write Box 203 care of Agricultural Chemicals.

Chemist-Entomologist
for
Insecticide Formulations

Large Eastern chemical manufacturer needs experienced chemist with entomological background and record of successful accomplishment to develop formulations for agricultural and household use. Send full information on training, experience, and expected salary.
The appearance of this advertisement has been announced in our own organization.

Address BOX 195
c/o AGRICULTURAL CHEMICALS

Young Offers New System

Young Machinery Co., Muncy, Pa., has announced its manufacture of a new blending system especially adaptable to the small dust mixer's needs. The system includes the intergrated use of a brush sifter, elevator, agitated hopper, machine blender and mixer. The latter serves the dual purpose of mixing and feeding customer's bagging device, according to H. T. Young, proprietor.

•

Georgi to Co-op Office

United Cooperatives, Inc., has announced the appointment of Ed. Georgi as technical advisor in its Philadelphia office, under the managership of R. Wayne Mills. Mr. Georgi was formerly with the Whitemarsh Laboratories of Pennsylvania Salt Co.

•

New Name for Gen. Chem.

General Chemical Company was merged November 1 with its parent firm, Allied Chemical & Dye Corp. As of that date the affiliate will be known as "General Chemical Division," Allied Chemical and Dye Corporation. The announcement says that no change in management or personnel is involved, and that except for the change in name, operations will be conducted as usual.

CONSULTING ENTOMOLOGIST
Insecticides — Formulation
Plant Pathology — Research
Entomology — Legal Service

Eighteen Years consulting work.
Thirty years technical agriculture.

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ALVIN J. COX, Ph.D.
Chemical Engineer and Chemist

(Formerly Director of Science, Government of the Philippine Islands; Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)

ADVISOR ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS

Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.

1118 Emerson Street
Palo Alto, California

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Ah, Memories!

HUMAN memory is notoriously short. Elephants may remember,—but, given half a chance, the first thing a human does is forget. That is particularly true in the case of busy persons in business and industry. Unless they are constantly reminded of you and your products, other matters,—and possibly competitive products, — move into their minds to replace thoughts of you. Hence, the farflung growth of modern advertising, the science of never letting people forget you.

And in the field of chemicals for agriculture, memories too are short,—but, never will they have a chance to forget if you advertise regularly in

AGRICULTURAL CHEMICALS

254 WEST 31st STREET **NEW YORK 1**

TALE ENDS

Ray L. Cuff, probably the world's foremost proponent of the use of DDT and other insecticides on cattle to increase their general health and well-being ... as well as their weight, recently suggested at a Kansas City gathering that "Red meat will repel the reds." "We are having dinned into our ears ... that if we don't feed western Europe, the people are going down into the rathole of Communism," he said. "Let's feed people and not parasites,' he continued. "Without one more head of livestock and without one extra pound of feed we are already increasing the poundage of meat that is being produced by the reduction of preventable losses ..." It's a fact that cattle lose weight when supporting thousands of insect parasites, and that the use of DDT can and does increase meat production. Well, what are we waiting for? Maybe YOU can answer that one.

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The Washington Post in reporting the recent meeting of Economic Poisons Control Officials, referred to the group as "Insecticidists." Maybe this will be a new possibility for discussion in numerous committees on nomenclature, already wrestling with the knotty problem of names for organic chemical toxicants.

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The St. Louis Better Business Bureau bulletin warns its readers against "Humus" peddlers who sell fertilizer materials of unknown quality to home owners. In one case a buyer contracted to pay $210 for an application of "blood and humus" ... a concoction which under laboratory analysis was proved to be practically worthless, and worth about $2.50 per hundred pounds. The total cost should have been around $12, the bulletin states. Looks like more education is needed so far as the public is concerned. The good name of reputable fertilizer manufacturers is ample protection against such frauds.

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THE
RAT
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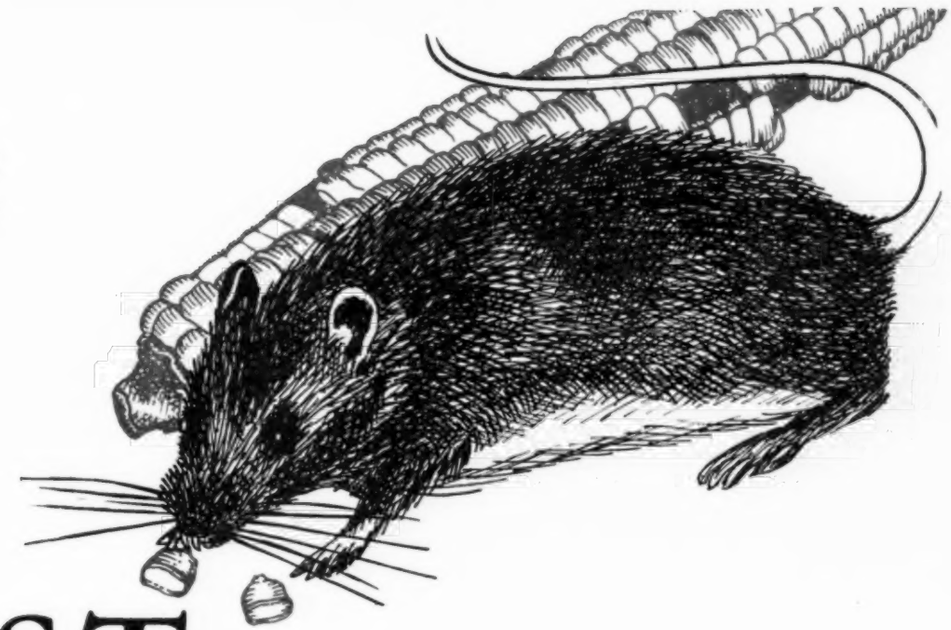

PEST OF THE MONTH

. . . controlled with Fortified Red Squill

WITH the storage season coming on, rat control becomes of immediate importance.

The grains, foodstuffs and finished and packaged foods that are being warehoused now are needed for our own consumption and to feed the hungry peoples of Europe and Asia. The $50,000,000 bill for rat-food is this year more than an economic waste, it can become a human tragedy.

Against this threat, Red Squill is a major weapon. It is the only material known to commerce that can be safely used for the control of rats in places where foodstuffs are prepared or stored. It thus offers an attractive sales opportunity for the winter months.

Prentox Fortified Red Squill, in powder or liquid form, provides a uniformly lethal rodenticide concentrate. Formulated with suitable baits in a concentration of 10% by weight, it provides the required minimum lethal dose, and gives the slow-acting toxicity so that the animals in most cases die out-of-doors.

Further information on *Prentox Fortified Red Squill*, and its formulation into baits, is available on request.

R. J. PRENTISS & CO., Inc.

110 WILLIAM STREET, NEW YORK 7, N. Y. 9 SO. CLINTON STREET, CHICAGO 6, ILL.

PRENTOX PEST-TESTED CONCENTRATES SOLD TO INSECTICIDE MANUFACTURERS ONLY

DDT CONCENTRATES • SABADILLA DUST CONCENTRATE • PYRETHRUM PRODUCTS • CHLORDANE CONCENTRATES • CUBÉ POWDER

Colorado Potato Beetle
Leptinotarsa decemlineata.
Approximately 9 times
natural size.

SANTOBANE (MONSANTO DDT)

The Colorado potato beetle is another dangerous agricultural pest successfully controlled with insecticidal formulations containing Santobane — Monsanto's DDT. Formulators have come to prefer Santobane because it is a free-flowing, uniform, granular substance that can be easily solubilized, emulsified or milled.

There is plenty of Santobane available for your requirements.

Inquiries regarding the properties, formulation and uses of Santobane will be promptly handled by — MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

Santobane: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

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